

# REPORT

OF THE

## LEVEE COMMISSION OF ENGINEERS

TO THE

GOVERNOR OF LOUISIANA

SESSION OF 1876.

NEW ORLEANS:

PRINTED AT THE REPUBLICAN OFFICE, 94 CAMP STREET.

1876.

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*U. S. Army*

*March 10<sup>th</sup>*

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OFFICE OF LEVEE COMMISSION OF ENGINEERS,

New Orleans, La., December 31, 1875.

To the Governor and the General Assembly of the State of Louisiana:

The Commission of Engineers appointed under Act No. 43, approved March 6, 1873, respectfully submit the following report:

The revised order, as finally adopted for the construction of levees during the levee year, extending from October 1, 1874, to October 1, 1875, as per list published in our last report, aggregated 1,086,200 cubic yards.

The Commission, on October 1, 1874, reported that at least 1,967,500 cubic yards of levee work was then needed "to protect large portions of the State from overflow," but, inasmuch as the available means applicable to levee construction were limited by law to the net proceeds of the three mill levee tax—for both the construction and the repair funds—the Attorney General of the State was applied to to determine whether or not it was the duty of the Commission to discriminate, and reduce the list of levees to be built, so as to bring the total number of yards down to an amount within the estimated ability of the State to pay for, out of the proceeds of the levee taxes of the year 1874, collectible in 1875. Could we insist upon the construction, by the contractor, of levees for which compensation could not be made?

The Attorney General, in reply, stated his opinion to be "that the funding bill (Act No. 3, of 1874,) limits the ability of the State to pay, for levee purposes, to the tax of three mills, and that the Levee Company, being, under the law, simply a contractor with the State to build levees at so much per cubic yard, can not be expected to build more levees than the State has the ability to pay for."

Act No. 43, of 1873, he says, "directs the Commission of Engineers 'on or before the first day of October in each year, to prepare a report, with a statement in detail of the number and location of the levees to be constructed during the year next ensuing.'"

"You will observe," says the Attorney General, "that the law refers to the levees 'to be constructed,' not to the levees that ought to be constructed, and as the Levee Company can be required to build only a limited number of the levees which ought to be built, it is manifestly proper that the Commission of Engineers should indicate the levees which shall be built."

This question having been settled—that the list of levees needed must be reduced to what the levee tax would pay for—it was deemed expedient to ask the concurrence of the Levee Company to the merging of the "repair fund tax with the construction fund tax, so that the number of cubic yards of levee work to be built" during the coming year might be such as to include the whole three-mill tax levied for levee purposes.

In reply to a communication addressed to the president of the Levee Company on the above subject, we were informed that the board of directors of the Levee Company had unanimously adopted the following resolution:

*"Resolved*, That the board, having considered the communication of the Commission of Engineers relative to the fusion or aggregation of the repair fund with the construction fund, so that the whole may be applied or used in the building of new levees, directs the secretary of the company to inform the Commission of Engineers that the Levee Company are sensible of the importance of building as many of the levees ordered by the Commission as the entire fund at their disposal may justify; but inasmuch as paragraph seven, of section two, of the act of 1871, provides that the repair fund 'shall be used for no other purpose than as provided,' the board of directors of the Levee Company desire to say that they accede to and will act upon the suggestion of the Commission of Engineers, and upon that of the Auditor with regard to such fusion; they, however, require, before giving a formal assent, authority to do so from the constituted authorities."

In accordance with the above, the Commission of Engineers then adopted the following preamble and resolutions:

WHEREAS, This board, in accordance with law, reported to the State Auditor, on the first day of October, the list and locations of levees deemed necessary for the protection of the alluvial lands of the State, amounting to 1,967,500 cubic yards of earth; and

Whereas, The communications above referred to render it absolutely necessary for this board to reduce the number of cubic yards by at least one-half, the obvious consequence being that certain necessary levees must be left unconstructed, and certain crevasses remain unclosed for the present, simply for the want of funds available to accomplish this purpose; be it therefore

*Resolved*, That this Commission do now proceed to correct and reduce the list of levees ordered on the first instant, to conform to the decision of the Auditor and Attorney General, and at the same time conform to the suggestion of the Auditor and agreement of the Louisiana Levee Company to fuse the repair-fund tax with the construction-fund tax, and will direct levee work to the amount of the full three-mill tax levied for levee purposes, and that orders be issued to the Louisiana Levee Company to construct the same in accordance with such locations, specifications, dimensions, and orders of construction, etc., as the board may furnish to the said company.

*Resolved*, From our present and prospective financial resources it is the firm conviction of this board that the alluvial basin of the State of Louisiana can not be permanently protected and reclaimed from inundation, save through the agency of and material aid from the General Government.

*Resolved*, That the Executive of the State, and our Senators and Representatives in Congress, be urged to make all possible efforts to accomplish this object at the coming session of Congress.

*Resolved*, That this board, in the performance of the compulsory task of reducing its original estimate of the levee work to be done, as a matter of absolute necessity, is actuated by the conviction that it is more expedient for the general interest of the State to close as far as possible the almost innumerable smaller breaks and crevasses than to expend entirely the limited means in closing the larger crevasses.

The list was then reduced, accordingly, to an aggregate, as before stated, of 1,086,200 cubic yards, omitting, among others, the large crevasses at Morganza and Bonnet Carré, below Red river, and several above.

In consequence of new or additional cavings of the river banks afterward, it became absolutely necessary to omit the construction of the Wilson's and Echo landing levees on Red river, the cut-off to the Yellow Bayou levee in Avoyelles parish, and the Cox and Melrose and Pittman and Barrow levees on the Lafourche, and to transfer the quantities allotted for these to other more necessary levees in other parts of the State; also, from necessity the Commission found it imperative to order the construction of additional or supplemental levees, payable out of the taxes of 1875-76; the cost of the same, according to law, having to be "credited to the account of said (levee) company on the next succeeding year."

The Commission had no precise data by means of which to estimate closely the revenue to become available out of taxes of 1874-75, but they assumed that it should be about half a million of dollars and that they might safely, therefore, order the construction of about one million cubic yards of levee earthwork.

The orders aggregated somewhat more, or 1,086,200 cubic yards, as before stated, when the list was finally adopted, in October, 1874.

Afterward, to prevent inundations from crevasses which would have resulted from additional cavings of the river banks in front of districts in full cultivation, additional levees were built, and the aggregate was swelled to 1,128,792 cubic yards.

The supplemental orders to build levees out of the levee-tax funds of 1875-76 amounted to 164,749 cubic yards. The total amount of levee work done, therefore, in 1874-75, amounted to 1,293,541 cubic yards, or 207,341 yards in excess of the original order, and on account of the year 1875-76.

The levees constructed under the provisions of the supplemental orders of the Commission out of the funds of the levee year 1875-76, were the following:

On the Mississippi river—

	Cubic Yards
Pierre Cosse levee, Plaquemine parish.....	2,252
Sarah levee, Plaquemine parish.....	435
City property levee, Plaquemine parish.....	957
Lacroix levee, Ascension parish.....	8,714
Arlington levee, East Baton Rouge parish.....	17,879
Australia levee, West Baton Rouge parish.....	38,843
Conrad Point levee, East Baton Rouge parish.....	4,121
Hope levee, East Baton Rouge parish.....	4,191
New Texas levee, Pointe Coupee parish.....	2,547
Bayou Vidal levee, Tensas parish (on account).....	9,096
Omega and Milliken's bend levee, Madison parish.....	6,206
Point Lookout levee, Carroll parish.....	55,746

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150,987

On Bayou Lafourche—

Parr levee, Lafourche parish.....	3,195
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On the Ouachita river—

Cuba landing levee, Ouachita parish.....	10,567
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Total.....	164,749
Excess constructed over original orders.....	42,592

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Total to be charged to year 1875-76..... 207,341

The levees constructed—other than the above—and estimated for the year 1874-75, were the following:

*Levees Certified by Commission of Persons, on Account of Series of 1874-75.*

NAME OF LEVEE.	NAME OF PARISH.	CUBIC YARDS CONSTRUCTED.
Elton.....	Carroll, Mississippi River....	11,279
Bass.....	Carroll, Mississippi River....	141,563
Goodrich.....	Carroll, Mississippi River....	11,981
Bass Extension.....	Carroll, Mississippi River....	51,585
		216,408
Machoire de l'Ours.....	Ouachita, Ouachita River....	20,005
Upper Pargoud.....	Ouachita, Ouachita River....	4,259
Lower Pargoud.....	Ouachita, Ouachita River....	7,509
		31,773
Waterproof.....	Tensas, Mississippi River....	78,115
Hard-scrabble.....	Tensas, Mississippi River....	26,338
Disharoon.....	Tensas, Mississippi River....	33,881
L'Argent.....	Tensas, Mississippi River....	4,620
Bon-aurant.....	Tensas, Mississippi River....	3,719
Hard Times.....	Tensas, Mississippi River....	19,023
		165,696
White.....	Rapides, Red River.....	7,939
		7,939
Farmers' Bayou.....	Avoyelles, Atchafalaya River.	9,059
Hetherwick.....	Avoyelles, Atchafalaya River.	3,750
Big Bend.....	Avoyelles, Bayou des Glaizes.	32,372
Yellow to Farmers' Bayou.....	Avoyelles, Bayou des Glaizes.	1,930
		47,111
Lake Side.....	P'te Coupee, Old River.....	9,232
Callihan.....	P'te Coupee, Atchafalaya R'r.	3,770
Doherty.....	P'te Coupee, Atchafalaya R'r.	10,511
Barber.....	P'te Coupee, Atchafalaya R'r.	7,208
Swords.....	P'te Coupee, Atchafalaya R'r.	3,271
Norwood.....	P'te Coupee, Atchafalaya R'r.	17,682
Ponite Coupee.....	P'te Coupee, Mississippi River	28,906
Red Store No. 1.....	P'te Coupee, Mississippi River	10,237
Hog Point.....	P'te Coupee, Mississippi River	28,230
Red Store No. 2.....	P'te Coupee, Mississippi River	12,262
Morrison.....	P'te Coupee, Mississippi River	7,840
		139,149
Pointe Manoir.....	W. B. Rouge, Mississippi R'r	40,506
Hereford.....	W. B. Rouge, Mississippi R'r	8,512
Lobdell.....	W. B. Rouge, Mississippi R'r	39,531
Walker.....	W. B. Rouge, Mississippi R'r	37,321
		125,869
Longwood.....	E. B. Rouge, Mississippi R'r.	15,925
Patrick.....	E. B. Rouge, Mississippi R'r.	5,640
Hickey.....	E. B. Rouge, Mississippi R'r.	105,566
Hebert.....	E. B. Rouge, Mississippi R'r.	9,528
		262,528
Thruillett.....	Iberville, Mississippi River...	6,366
Schlatre.....	Iberville, Mississippi River...	29,439
White Castle.....	Iberville, Mississippi River...	36,084
Old Hickory, or Lauve.....	Iberville, Mississippi River...	2,299
		74,188
Stansbury.....	Ascension, Mississippi River.	12,782
Brand, or Picayune.....	Ascension, Mississippi River.	3,226
		16,008

## LEVEES CERTIFIED BY COMMISSION OF PERSONS.—Continued.

NAME OF LEVEE.	NAME OF PARISH.	CUBIC YARDS CONSTRUCTED.	
Moreau .....	Lafourche, Bayou Lafourche.	2,940	
Selby .....	Lafourche, Bayou Lafourche.	1,119	
Dr. Head .....	Lafourche, Bayou Lafourche.	5,128	9,187
Turcuit .....	St. James, Mississippi River.	17,158	
Cabanahocoy .....	St. James, Mississippi River.	6,700	
Labourgeois .....	St. James, Mississippi River.	2,961	
Bourbon .....	St. James, Mississippi River.	1,360	28,179
Vickman .....	St. John, Mississippi River..	12,101	
Bismarek .....	St. John, Mississippi River..	4,621	
Poor Devil's Store .....	St. John, Mississippi River..	1,947	
Bonnet Carre .....	St. John, Mississippi River..	1,176	
Carroll .....	St. John, Mississippi River..	3,654	23,499
Champagne .....	St. Charles, Mississippi River	6,134	6,134
Wall .....	Jefferson, Mississippi River..	6,188	
Kennerville .....	Jefferson, Mississippi River..	19,468	
Oakland, or B. Kenner .....	Jefferson, Mississippi River..	6,275	31,931
Orleans .....	Orleans, Mississippi River...	10,609	10,609
St. Rosalie .....	Plaquemine, Mississippi River	3,687	
Verbois .....	Plaquemine, Mississippi River	6,661	
Pointe a la Hache .....	Plaquemine, Mississippi River	20,833	
Scarsdale .....	Plaquemine, Mississippi River	7,600	
Belle Chasse .....	Plaquemine, Mississippi River	15,050	
Orange Grove .....	Plaquemine, Mississippi River	3,000	
Orange Farm .....	Plaquemine, Mississippi River	1,622	58,453
Total cubic yards constructed on account of 1874-'75 .....			1,128,792
Total cubic yards ordered by Commission of Engineers for same, October 14, 1875 .....			1,086,200
Cubic yards constructed in excess of original orders of the Commission of Engineers, but covered by supplemental orders .....			42,592
By order of the Commission.			

F. M. KERR, Secretary.

Fortunately, the large amount of levee work done in 1874-75 proved adequate for the protection of the country exposed, except, as stated below, ~~and~~ for the portions behind the larger breaks, which could not be closed for want of available means.

The levees to close the great crevasses at Morganza, in Pointe Coupee parish, and at Bonnet Carre, in St. John parish, as well as several others in upper Louisiana—the two former would alone have required half a million cubic yards, or one-half the quantity allowable for the entire State—were of necessity omitted.



With a view to facilitate an understanding of what amounts are collected from taxpayers, and of what becomes available for levee construction under the existing laws, and the contract with the Levee Company, the following statements—obtained through the State Treasurer's office, and compiled from the Auditor's reports—showing the amounts assessed, amounts paid into the State treasury, amount reserved as compensation to tax assessors and collectors, and amount remaining available for levee building since 1871, to December 1, 1875, are submitted.

To October 1, 1873, the levee tax was four mills, and since then it has been three mills on the dollar of all taxable property in the State. The assessed valuation of taxable property in the State—because of its continued depreciation—has steadily diminished since 1870, but the depreciation is much more, according to the assessments, in the country parishes, than in the city of New Orleans.

## STATEMENT

*Of Levee Taxes collected from 1871 to December 1, 1875, and Commissions allowed to Tax Collectors.*

LEVEE TAXES—WHERE COLLECTED.	Balance paid into State Treasury in 1872.	Balance paid into State Treasury in 1873.	Balance paid into State Treasury in 1874.	Total paid into State Treasury in 1872-'3-'4.	Commissions retained by Collectors.	Amounts retained by Tax Collectors.	Total Amounts contributed by Tax Payers.
First New Orleans District.....	\$161,076 22	\$162,560 40	\$125,618 04	\$449,254 66	2½ per cent.	\$11,519 34	\$460,774 00
Second New Orleans District.....	59,274 42	129,507 54	80,717 09	269,499 05	3 per cent.	9,262 86	308,761 91
Third New Orleans District.....	25,506 02	31,149 62	32,060 85	88,716 49	8 per cent.	.....	.....
Fourth New Orleans District.....	28,225 46	53,942 14	28,966 48	111,074 08	8 per cent.	17,373 08	217,163 65
Fifth New Orleans District.....	2,880 72	5,300 04	5,870 65	14,051 41	10 per cent.	.....	.....
Sixth New Orleans District.....	15,760 76	24,857 18	18,722 48	59,340 42	10 per cent.	8,155 65	81,556 48
Amount paid by New Orleans.....	\$322,732 00	\$407,316 92	\$291,895 59	\$1,021,945 11	6 6-10 per ct.	\$46,310 93	\$1,068,256 04
Amount paid by balance of State.....	114,468 32	115,795 64	238,654 09	468,918 05		52,162 00	521,020 05
Entire State.....	\$437,200 92	\$523,112 56	\$530,549 68	\$1,490,863 16	6 6-10 per ct.	\$98,412 93	\$1,589,276 09
Entire State in 1875, to December 1.....				429,300 00		30,335 95	459,635 95
Totals to December 1, 1875.....				\$1,920,163 16		\$128,748 88	\$2,048,912 04
Amount paid to Tax Assessors by warrants on Treasury—State Treasurer's statement.....						87,232 43	
Total amount paid to Assessors and Collectors and diverted from levee building.....						\$215,981 31	
Limit of compensation to Assessors and Collectors by Act 27, of 1871, one per cent. or.....						20,489 12	
Balance which should have been applied to levee building.....						\$195,492 19	

According to the provisions of article 5, of section 1, of act 27, approved February 28, 1871, which is a part of the contract of the State with the Levee Company, "a commission of one per cent. on the amount collected shall be allowed as a compensation to such officers on whom shall devolve the collection of the taxes imposed by the act of the General Assembly hereinbefore referred to, (act No. 4, of 1871,) to be deducted and paid out of the funds of the company."

Instead, however, of a "commission of one per cent.," as above provided for, there has been allowed, under the provisions of the general revenue laws, "out of the funds of the company" for levee building purposes, the extraordinary commissions of five per cent. of the collectible tax for assessing, and ten per cent. of the amount collected for collecting, in all the country parishes, besides allowances to parish clerks, recorders and sheriffs. In the country, the offices of assessor and collector are filled by the same person. In New Orleans, now, seven assessors are paid salaries of \$4000 each, \$1000 contingent fee each, and \$17,000 is allowed to the board for expenses in addition.

The collectors, in New Orleans, receive, for the First District, two and a half per cent. for current and ten per cent. for back taxes; for the Second District, three per cent. for current and ten per cent. for back taxes; for the Third and Fourth Districts, eight and ten per cent.; for the Fifth, Sixth and Seventh Districts, ten per cent. for current and back taxes.

In this way, as the table shows, a very large amount has been deducted from the total collections for levee purposes, instead of "one per cent." as "compensation to such officers on whom shall devolve the collection of taxes," thereby reducing very considerably the amount of levee work which can be done each year.

In all, so far, an amount has been diverted which would have been nearly, if not quite, sufficient to close the great Morganza and Bonnet Carré crevasses, now left open for want of funds to close them.

*The following statement will show what has been the total taxable valuation of property in Louisiana since the war:*

Year.	Country Parishes	New Orleans.	Total.
1870 .....	\$100,206,855	\$151,809,162	\$251,296,017
1871 .....	92,380,053	158,214,364	250,594,417
1872 .....	79,271,951	149,394,702	228,666,653
1873 .....	77,457,117	146,781,402	224,238,519
1874 .....	64,613,925	135,950,785	200,564,710
1875 .....	.....	124,582,102	.....

It has been said that taxable property is assessed too low in the country parishes and too high in the city of New Orleans. The reduction in valuation since 1870, to 1874 inclusive, it will be observed, is more than one-third in the country and only about one-fifth in the city. It would seem, therefore, that the system of valuation has not been uniform.

The present levee tax, on all the property in the State, was imposed in 1871. Under it, the city of New Orleans, as well as Shreveport, Natchitoches, Alexandria and Baton Rouge, pay a levee tax although not directly benefited thereby. In New Orleans, property is taxed for leveeing and drainage purposes in addition to the general State levee tax. It will be seen, also, by the foregoing tables, that New Orleans—exclusive of Carrollton—has paid more than double, for general levee purposes, what has been contributed by the entire State outside of New Orleans.

The parishes directly benefited by levees, more or less, (but some of them to a very small extent only, as for instance East Baton Rouge, St. Mary, St. Martin, Iberia and St. Landry, and others on the Ouachita and Red rivers)—outside of New Orleans, contribute but a very small proportion of the general levee tax.

The following statements will show the relative amounts, as per the parish assessments, compiled from the State Auditor's reports, which have been contributed by the river valley parishes, by parishes partially benefited, and what by New Orleans, and the upland parishes not needing levee protection, for levee building purposes.

It should be borne in mind that previous to the existing levee laws and levee contract, State bonds were issued to raise means to pay contractors, under boards of levee commissioners, for levee con-

struction, and that more than eight millions of bonds were so issued. No specific tax to raise funds directly for levee building had ever been imposed prior to 1871, except locally, in certain parishes.

The present general and direct levee tax was imposed under and by virtue of the laws creating and contracting with the Levee Company, and for the sole and exclusive purpose of paying said company for the levees to be constructed by it under its contract.

The law provides that "said tax, when collected \* \* shall be set apart as a special fund, \* \* which shall not be used for any other purpose than as compensation to said Louisiana Levee Company;" and this forms a part of the existing contract.

The existing levee system and tax and contract are, therefore, it would seem, inseparable parts of one whole; they must stand or be abrogated together, if the latter is possible otherwise than by consent of both parties to the contract.

It is not at all probable that a general direct levee tax could ever again be imposed in Louisiana, and it seems clear that relief from burden of levee maintenance can only come from the General Government, if the levees are to be kept up.

The present system and tax, however oppressive and burdensome the latter may be, are better than no levee system; at least to the residents of the alluvial parishes. If levee maintenance is left to them alone, it is certain that no levees worthy of mention will be built at all, and that our sugar and cotton fields generally will again become a wilderness.

The State constitution, as it now stands, fortunately, prohibits any further issue of State bonds, as well as any increase of the State debt. The taxpayers would not, probably, consent to the imposition of any new tax, or the re-imposition of any old tax when once repealed, even if any such thing can be done at all under the provisions of the new constitutional amendments.

Mississippi river valley parishes exposed to inundation, and wholly dependent upon levees for protection:

Carroll, Madison, Tensas, Concordia, Pointe Coupee, West Baton Rouge, Iberville, Ascension, Assumption, Terrebonne, Lafourche, St. James, St. John, St. Charles, Jefferson, St. Bernard, Plaquemines.

The assessed valuation of taxable property in these parishes in 1871, 1872, 1873, 1874, was as follows:

1871.	1872.	1873.	1874.
\$40,124,405 82	\$33,854,266 00	\$30,924,497 05	\$24,543,830 50

Parishes more or less exposed to partial inundation, and therefore to some extent benefited by levees:

East Baton Rouge, St. Mary, Iberia, St. Martin, St. Landry, Caddo, Bossier, Red River, Rapides, Natchitoches, Avoyelles, Catahoula, Ouachita, Morehouse, Richland, Caldwell, Franklin.

The assessed valuation of property in these parishes in 1871, 1872, 1873, 1874, was as follows:

1872.	1873.	1874.	1871.
\$28,569,263 71	\$30,811,408 17	\$26,141,648 35	\$34,376,580 31

Parishes not exposed to inundation, which derive no benefit from the construction of levees:

East Feliciana, West Feliciana, Helena, Livingston, Tangipahoa, Washington, St. Tammany, DeSoto, Sabine, Webster, Claiborne, Bienville, Jackson, Union, Winn, Grant, Calcasieu, Cameron, Vermilion, Lafayette, Vernon, Lincoln.

The assessed valuation of property in these parishes in 1871, 1872, 1873, 1874, was as follows:

1871.	1872.	1873.	1874.
\$15,700,561 47	\$14,849,694 88	\$15,697,319 78	\$14,007,711 28

*Taxable Valuation of Property in the Several Districts Given, and in New Orleans.*

Year.	Exposed Valley Parishes.	Parishes Partly Exposed.	Upland Parishes.	New Orleans.
1871 .....	\$40,124,405 82	\$34,376,580 31	\$15,700,561 47	\$158,214,364 00
1872 .....	33,854,266 00	28,569,263 71	14,849,694 88	149,394,302 00
1873 .....	30,924,497 05	30,811,408 17	15,697,319 78	146,720,527 00
1874 .....	24,543,830 50	26,141,648 35	14,007,711 28	143,900,785 00

The proportions of levee tax paid by the different portions of the State in 1872 for 1871, 1873 for 1872, 1874 for 1873, at four mills per dollar, and in 1875 for 1874, and thenceforward, at three mills per dollar, may be estimated from the above tables.

In 1874, the Commission inspected the levees during the months of July and August, when the river was declining. In August, 1875, a flood occurred in the upper rivers, which raised the lower river within a few feet of high water mark, and it became necessary to defer the inspection. The caving of the river banks occurs, principally, as the water recedes, and most after the river has declined below a half stage. The later the examination is made, therefore, the better, because a more correct estimate of what will be needed for levee construction to replace levees which cave in, or become endangered by the caving in of the river banks, can then be made. But the law provides that the list of levees to be ordered for the new year shall be made out by the first of October. Consequently the inspection can not be postponed later than September.

The Commission met on the tenth of September, 1875, and the following correspondence resulted:

#### THE LEVEES AND THE COMMISSION OF ENGINEERS.

##### OFFICE OF COMMISSION OF ENGINEERS,

New Orleans, September 10, 1875.

To Lieutenant Governor and Acting Governor of the State of Louisiana, C. C. Antoine :

SIR—The undersigned, Commission of Engineers, have the honor to report as follows :

Act No. 4, of 1870, provides that "In order to maintain a uniform and perfect system, the location and dimensions of all levees to be constructed, maintained, repaired and kept in repair and managed, shall be determined by a Commission of three engineers." Act No, 43 of 1873, re-enacts this, and further provides that "They (said Commission) shall also on or before the first day of October in each year prepare a report, with a statement in detail, of the number and location of the levees to be constructed during the year next ensuing, with a careful estimate of the number of cubic yards such levees will contain when completed, and shall deliver one copy of said statement and estimate to the Governor of the State, one copy to the Auditor of Public Accounts, and one copy to the president of the Louisiana Levee Company; and the said company shall not be required to build during the year any levees, except those required to be built by said Commission." From the above it is clear that no levees can be built unless ordered by this Commission.

This Commission is now, and has been for some time, ready to perform the duties assigned to it by law. Unfortunately our operations are obstructed by two potent causes:

1. The protracted high stage of the river.
2. Want of funds.

Owing to the first cause, surveys heretofore could not accurately be made to establish the sites of the necessary new levees.

Owing to the second cause they can not move at all.

Money is required to pay costs of surveys, transportations, and other contingent expenses. The last Legislature made no appropriation for paying these expenses. Even the salaries of two engineers of the Commission, and of the secretary, are withheld. The levee interests of the State of Louisiana is a subject too important to be trifled with or neglected, and needs no discussion here.

Paralyzed as we are, our only hope is to appeal to you, the acting Governor of the State, for advice and material aid in this matter. Respectfully requesting an early answer, we have the honor to be, very respectfully, your obedient servants,

JAMES LONGSTREET.

President of Board of Commission;

P. O. HEBERT,

G. W. R. BAYLEY,

Civil Engineers.

STATE OF LOUISIANA, EXECUTIVE DEPARTMENT,

New Orleans, September 10, 1875.

General James Longstreet, Hon. P. O. Hebert, and G. W. R. Bayley, Esq., Commission of Engineers :

GENTLEMEN—I have the honor to acknowledge the receipt of your communication of this date, setting forth the imperative duties imposed upon you by law with regard to the location of the levees required to be built within the limits of the State of Louisiana for the current year, and stating that your Commission is now ready to perform the duties assigned to it, but is prevented by the fact that the last Legislature made no appropriation for the cost of surveys, transportation and other contingent expenses.

I recognize the great importance to the planting interests, and to the State at large, of a prompt location of the levees necessary to be constructed in order to secure our alluvial lands from overflow,



but I am powerless to remedy the omission of the Legislature in failing to make adequate appropriation for this purpose.

I will, however, recommend to the law officers of the State to apply for the release of the injunctions which you inform me now rest upon the salaries of two of the engineers of the Commission. I further feel justified under the circumstances in officially authorizing you to make such arrangements as may be requisite to carry out the work, and I feel sure that on the reassembling of the Legislature the Governor will recommend the passage of such an appropriation as will cover all the necessary expenses you may incur in carrying out the provisions of act No. 4 of 1870, and of act No. 43 of 1873, to which you call my attention.

Very respectfully,

C. C. ANTOINE,

Lieutenant and Acting Governor.

A copy of the acting Governor's letter was then transmitted, with the following letter, to the President of the Levee Company:

OFFICE COMMISSION OF ENGINEERS, STATE HOUSE,  
September 11, 1875.

To the President of the Louisiana Levee Company:

SIR—We have the honor to transmit an official communication of the Lieutenant Governor and Acting Governor C. C. Antoine, of the State of Louisiana.

The communication explains itself:

We further have the honor to ask whether you are prepared and willing to furnish, immediately, the funds necessary to cover the costs of the transportation, surveys and contingent expenses of this Commission, in the performance of their duties in accordance with law.

The reimbursement of funds advanced by your company to be made in the manner advised by the acting Governor of the State.

We would state that this call would not be made upon you but for the fact that the last Legislature failed to make appropriations for the purposes above indicated.

It is self-evident, from the interpretation of the laws governing the construction of levees, that no levees can be built unless the same are duly ordered by this Commission.

It would be a matter of supererogation to urge here the necessity

of certain levees for the protection of the cultivated alluvial lands of this State.

Requesting an early answer, we have the honor to be, very respectfully, your obedient servants,

JAMES LONGSTREET,  
P. O. HEBERT,  
G. W. R. BAYLEY,  
Commission of Engineers.

The above communication having been presented to the President of the Levee Company, Mr. John Henderson, he consented to provide for the Commission in the manner suggested, with the understanding, however, that the expenditures should be limited to the least amount possible consistent with the accomplishment of the purposes intended.

The steamboat Garry Owen was then chartered to convey and provide for the Commission and their assistants, from New Orleans to the upper limits of the State and return, stopping wherever deemed necessary for the examination and surveys, at one hundred dollars per day, payable on the order of the President of the Commission.

For the purpose of economy, the utmost possible expedition was used, and only twelve days' time, from the evening of September 16 to the evening of September 28, were consumed in the trip. The possession of accurate maps and notes of all the river levees, the experience and knowledge gained in previous years by the Commission, and the State Engineer—who was present and rendered valuable information and aid—enabled us to inspect all the levees requiring renewal or reconstruction, and determine the location and dimensions of all new levees needed. Every exposed point was examined from New Orleans to Lake Providence bend, including the upper portion of Atchafalaya river.

As in the previous year, vastly more levee work was found to be needed than could possibly—for want of means—be done; and, as before, the Commission had the disagreeable but necessary duty to perform of discriminating between what levees ought to be and what should be built. It was again seen that the great works could not be undertaken.

On our return, the following letter was addressed to the State Auditor:

OFFICE COMMISSION OF ENGINEERS, September 30, 1875.

Hon. Charles Clinton, Auditor of Public Accounts:

SIR—The undersigned, the Commission of Engineers, have the honor to transmit in accordance with the law a list of the levees, with measurements in cubic yards and with locations, deemed in the judgment of the Commission actually necessary for the protection of the lands of the State subject to overflow.

The Commission regrets that its operations were delayed by two causes: the protracted high stage of the river, and the want of funds to meet expenses for transportation and surveys.

In consideration of the fact, however, that no levees could by provision of law be constructed unless located and ordered by this Commission, arrangements were made with the Louisiana Levee Company, in virtue of official authority from the acting Governor, and transportation furnished. The result of our examination is before you.

The quantity of cubic yards may appear large, but the necessity is imperative and remorseless. Indeed, as further caving casualties may happen to the levees as the water recedes, the quantity will in all probability be increased.

Aware that the levee tax will not cover the cost of construction of all the levees, the Commission respectfully requests that you furnish it with an approximate estimate of the funds that can be counted upon for the construction of levees during the coming "levee year."

Should your report of the amount of tax that will probably be collected and become available for the construction of levees force upon us the difficult and unenviable task of discrimination, the Commission must exercise and meet as best it can that responsibility. It will shape its orders of construction accordingly.

As the time for letting out the work of construction is at hand, and as the work is of inestimable importance, we shall anxiously await your report, as our orders can not be issued until it is received.

We are very respectfully your obedient servants,

JAS. LONGSTREET,

P. O. HEBERT,

G. W. R. BAYLEY,

Commission of Engineers.

LIST OF LEVEES NECESSARY FOR THE PROTECTION OF THE ALLUVIAL LANDS  
OF THE STATE OF LOUISIANA FOR THE SEASON OF 1875-76, WITH QUAN-  
TITIES IN CUBIC YARDS AND LOCATIONS, BY THE COMMISSION OF ENGINEERS,  
IN ACCORDANCE WITH LAW.

1—Ashton levee, Carroll parish.....	350,000	
2—Elton levee, Carroll parish.....	32,000	
3—Deason or Stone levee, Carroll parish.....	8,800	
4—Goodrich levee, Carroll parish.....	32,000	
5—Point Lookout levee, Carroll parish.....	55,746	
6—Stamboul levee, Carroll parish.....	6,000	
7—Raleigh levee, Carroll parish.....	3,908	
8—Belle Raleigh levee, Carroll parish.....	70,000	
9—Belle Pointe levee, Carroll parish.....	6,600	
	<hr/>	565,054
10—Omega No. 1 levee, Madison parish.....	24,000	
11—Omega No. 2 levee, Madison parish.....	30,000	
12—Milliken's and Omega levee, Madison parish..	6,206	
13—Milliken's Bend levee, Madison parish.....	63,000	
14—Maher levee, Madison parish.....	22,000	
15—Diamond Bend levee, Madison parish.....	310,000	
16—Hycos levee, Madison parish.....	49,000	
17—Kellogg levee, Madison parish.....	35,000	
18—Harper's Bayou levee, Madison parish.....	60,000	
	<hr/>	599,206
19—Bayou Vidal levee (to complete), Tensas parish.....	25,000	
20—Styx levee, Tensas parish.....	37,000	
21—Buckridge levee, Tensas parish.....	120,000	
22—Ship's Bayou levee, Tensas parish.....	28,000	
23—Upper Hard Times levee, Tensas parish.....	25,000	
24—Bondurant levee, Tensas parish.....	30,000	
25—Waterproof levee, Tensas parish.....	17,500	
26—L'Argent levee, Tensas parish.....	5,400	
	<hr/>	287,900
27—Arnuldia levee, Concordia parish.....	3,500	
28—Deer Park levee, Concordia parish.....	9,000	
29—Ashley's levee, Concordia parish.....	5,000	
30—Glascock's levee, Concordia parish.....	18,000	
31—Brabston's levee, Concordia parish.....	4,800	
	<hr/>	40,300
32—New Texas levee, Pointe Coupee parish.....	2,547	
33—Morganza levee, Pointe Coupee parish.....	200,000	
	<hr/>	202,547
34—Cain & Winter levee, W. Baton Rouge parish..	8,200	
35—Lobdell No. 1 levee, W. Baton Rouge parish..	11,450	
36—Lobdell No. 2 levee, W. Baton Rouge parish..	8,200	
37—Court House levee, W. Baton Rouge parish..	5,000	
38—Railroad Depot levee, W. Baton Rouge parish..	5,000	
39—Australia No. 1 levee, W. Baton Rouge parish..	38,843	
40—Australia No. 2 levee, W. Baton Rouge parish..	2,000	
	<hr/>	78,689

41—Arlington levee, E. Baton Rouge parish.....	17,879	
42—Hope levee, E. Baton Rouge parish.....	4,191	
43—Conrad levee, E. Baton Rouge parish.....	4,121	
44—Hollywood levee, E. Baton Rouge parish ...	2,000	28,191
45—Craighead levee, Iberville parish.....	5,000	
46—Plaisance No. 1 levee, Iberville parish.....	8,000	
47—Plaisance No. 2 levee, Iberville parish.....	7,200	
48—Dunboyne levee, Iberville parish.....	9,500	
49—Bayou Goula levee, Iberville parish.....	5,000	
50—Moore & Rogers' levee, Iberville parish.....	8,000	42,700
51—Gem levee, Ascension parish.....	55,000	
52—Picayune levee, Ascension parish.....	21,500	
53—Smoke Bend levee, Ascension parish.....	15,000	
54—Lacroix levee, Ascension parish.....	8,713	100,213
55—Lapice Lauderdale levee, St. James parish...	4,100	
56—Lapice Pavy levee, St. James parish.....	3,500	
57—Cabanoce levee, St. James parish.....	30,000	37,600
58—Bonnet Carre levee, St. John parish.....	300,000	
58½—Carroll revetement levee, St. John parish...	4,000	304,000
59—Wall levee, Jefferson parish.....	12,700	12,700
60—Sta. 5 & 23 to 417 levee, Plaquemines parish.	35,300	
61—Logan levee, Plaquemines parish.....	1,000	
62—Pierre Cosse levee, Plaquemines parish.....	2,252	
63—Union Church levee, Plaquemines parish....	600	
64—Bohemia levee, Plaquemines parish.....	3,000	
65—Royet to Laur levee, Plaquemines parish....	5,400	
66—Frederick to Union levee, Plaquemines parish.	25,600	
67—Harlem levee, Plaquemines parish.....	2,500	
68—Fantaisie levee, Plaquemines parish.....	3,400	
69—Fanny levee, Plaquemines parish.....	2,700	
70—Carnacroon levee, Plaquemines parish....	10,000	
71—Belle Chasse No. 1 levee, Plaquemines parish.	2,500	
72—Belle Chasse No. 2 levee, Plaquemines parish.	5,300	
73—St. Anne levee, Plaquemines parish.....	3,000	
74—Sarah levee, Plaquemines parish.....	435	
75—Live Oak levee, Plaquemines parish.....	6,200	
76—Oakville levee, Plaquemines parish.....	1,200	
77—City Property No. 1 levee, Plaquemines parish.	957	
78—Myrtle Grove levee, Plaquemines parish....	8,000	
79—La Reussitte levee, Plaquemines parish....	1,200	
80—St. Rosalie levee, Plaquemines parish.....	2,100	
81—City Property No. 2 levee, Plaquemines parish	20,000	
82—Pointe Celeste levee, Plaquemines parish....	2,500	145,144

83—New Orleans levee, Orleans parish . . . . .	7,500	7,500
ATCHAFALAYA RIVER.		
84—Winstead levee, Pointe Coupee parish . . . . .	3,200	
85—Bunough's levee, Pointe Coupee parish . . . . .	7,200	
86—Smith & Taylor levee, Pointe Coupee parish . . . . .	16,800	
87—Bayou Moreau levee, Pointe Coupee parish . . . . .	2,000	
88—Sutton levee, Pointe Coupee parish . . . . .	3,600	
89—North & Smith levee, Pointe Coupee parish . . . . .	7,000	
90—Marine Bayou levee, Pointe Coupee parish . . . . .	25,000	
91—Wright's levee, Pointe Coupee parish . . . . .	4,200	69,000
92—Jos. Callahaus' levee, Avoyelles parish . . . . .	12,000	
93—Sewall levee, Avoyelles parish . . . . .	7,000	
94—Winn Estate levee, Avoyelles parish . . . . .	27,000	46,000
95—Burton levee, St. Landry parish . . . . .	10,000	10,000
BAYOU DE GLAIZE.		
96—Cut-off to Yellow Bayou levee, Avoyelles parish . . . . .	10,000	
97—Stribbling's levee, Avoyelles parish . . . . .	800	10,800
BAYOU LAFOURCHE, LAFOURCHE.		
98—Parr levee, Lafourche parish . . . . .	3,195	
99—Melrose levee, Lafourche parish . . . . .	500	
100—Cox levee, Lafourche parish . . . . .	500	
101—Pittman & Barrow levee, Lafourche parish . . . . .	10,000	14,195
OUACHITA RIVER.		
102—Cuba Landing levee, Ouachita parish . . . . .	10,567	
103—King's Bend levee, Caldwell parish . . . . .	6,200	16,767
RED RIVER.		
104—Mack's Bayou levee, Bossier parish . . . . .	10,900	
105—Murrey's Bayou levee, Bossier parish . . . . .	31,400	42,300
106—Sullivan's Bayou levee, Rapides parish . . . . .	27,000	
107—Crosby's Bayou levee, Rapides parish . . . . .	24,000	
108—Rapides Island levee, Rapides parish . . . . .	30,000	
109—Moore's levee, Rapides parish . . . . .	4,100	
110—Cumming's Point levee, Rapides parish . . . . .	82,000	
111—Cumming's Crevasse levee, Rapides parish . . . . .	4,400	
112—Chambers' (two breaks) levee, Rapides parish . . . . .	8,000	
113—Compton levee, Rapides parish . . . . .	8,000	
114—Cornelia levee, Rapides parish . . . . .	6,800	
115—Beaver Dam levee, Rapides parish . . . . .	23,000	

116—Sugar Farm levee, Rapides parish.....	10,000	
117—Stafford's levee, Rapides parish.....	6,800	
118—Wright's levee, Rapides parish.....	24,000	
119—Compton & Wilson's levee, Rapides parish.	48,300	
120—Echo Landing levee, Rapides parish.....	27,000	
121—Pierce's (three crevasse) levee, Rapides parish.....	3,600	
	<hr/>	337,000
122—Cannisinea levee, Red River parish.....	10,300	
	<hr/>	10,300
Total quantity in cubic yards.....	3,008,110	

## SUMMARY.

	CUBIC YARDS
Thirty-one levees required on Mississippi river, right bank, above mouth of Red river.....	1,492,460
Fifty-three levees required on Mississippi river, including both banks, below Red river.....	959,288
Twelve levees required on Atchafalaya river.....	125,000
Nineteen levees required on Red river.....	389,600
Two levees required on Onachita river.....	16,767
Four levees required on Bayou Lafourche.....	14,195
Two levees required on Bayou De Glaize.....	10,800
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One hundred and twenty-two levees required, aggregating.....	3,008,110

## LIST BY PARISHES AND RIVERS.

Nine levees in Carroll parish.....	565,054
Nine levees in Madison parish.....	599,206
Eight levees in Tensas parish.....	287,900
Five levees in Concordia parish.....	40,300
Four levees in Pointe Coupee parish.....	222,197
Five levees in West Baton Rouge parish.....	59,043
Four levees in East Baton Rouge parish.....	28,191
Six levees in Iberville parish.....	42,700
Four levees in Ascension parish.....	100,213
Three levees in St. James parish.....	37,600
Two levees in St. John parish.....	304,000
One levee in Jefferson parish.....	12,700
One levee in Orleans parish.....	7,500
Twenty-three levees in Plaquemines parish.....	145,144
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Mississippi river parishes.....	2,451,748
	<hr/>
Eight levees in Pointe Coupee parish.....	690,000
Three levees in Avoyelles parish.....	46,000
One levee in St. Landry parish.....	10,000
	<hr/>
Atchafalaya river parishes.....	125,000



Two levees in Avoyelles, on DeGlaize.....	10,800
Two levees in Bossier parish.....	42,300
Sixteen levees in Rapides parish.....	337,000
One levee in Red River parish.....	10,300
Red river parishes.....	389,600
One levee in Ouachita parish.....	10,567
One levee in Caldwell parish.....	6,200
Ouachita river parishes.....	16,767
Four levees in Lafourche parish, on Bayou Lafourche....	14,195
Grand total again.....	3,008,110

It may be said here, that, as predicted in the letter addressed to the State Auditor, additional savings of the river bank have occurred, in a number of places, whereby the list of levees needed will be increased in Carroll, Madison, Tensas and Concordia parishes above Red river, and in Pointe Coupee, Iberville, St. James, St. John and Jefferson parishes below Red river, to an extent sufficient to swell the above aggregate to considerably more than the estimate.

The following letter, in response to the communication addressed to the Auditor, September 30, was received on the 10th of October:

STATE OF LOUISIANA, AUDITOR'S OFFICE,

New Orleans, October 1, 1875.

General Jas. Longstreet, President of Commission of Engineers:

GENERAL—I have the honor to acknowledge receipt of the communication from your Board of the 30th ultimo, with inclosed list of levees ordered to be constructed for the ensuing levee year, aggregating 3,008,110 cubic yards.

In the absence of the Auditor, I am constrained to defer giving you an elaborate reply. I may say, however, that since Mr. Clinton's to you of October 7, 1874, on the same subject, I know of no occurrence which would justify a change or modification of his views in the premises as expressed to you in the communication alluded to.

The levee tax being the same as last year, the probable revenue depends on the assessment, and that has not been increased or diminished sufficiently to materially effect the amount of collectable tax.

What proportion will be collected during next year can only be estimated, and this I venture to say you can do as satisfactorily as I can.

I see no reason to think the proportion will vary materially from that of last year.

Very respectfully, your obedient servant,

J. A. SHOLTZ,

Chief Clerk and Acting Auditor.



This Commission has keenly felt the responsibility of discrimination imposed upon it in regard to levee construction, in being forced to order levees in accordance with the probable amount of levee tax to be collected each year, with no precise data upon which to base an estimate of what this amount would be. For the purpose of getting light upon this matter we applied officially—as shown in the foregoing letter—to the Auditor of Public Accounts. His answer—given above—as will be seen, left us just where we were before the inquiry.

We were referred to our own judgment to solve the question.

The levee contractor, the Louisiana Levee Company, has, to the best of our knowledge and belief, performed its duty as a contractor since this Commission have had the direction of the State levee system.

It has constructed, and in a satisfactory manner, all the levees which the Commission has ordered. It has done more than it could justly have been required to do, for it was called upon to build levees up to the extreme limit—last year—of the levee tax, without deduction for non-collections and non-returns; and, in addition, it built levees out of the prospective tax of a succeeding year, when a very large amount of work done, received and estimated for in previous years, had not been paid for.

The indebtedness of the State to the Levee Company comes not within our province to discuss. The claim stands upon its merits. It is a matter of equitable settlement between the State and the company.

We only state what we have said above as a matter of strict justice, and wholly unbiased.

Last year—1874—we estimated the amount to become available at \$500,000, or sufficient to pay for one million cubic yards of levees, but we ordered even more, because of pressing necessities. It is now evident that our estimate was too large. We did not allow sufficiently for deficiencies of collections and the more than eleven per cent. diverted as compensation to collectors and assessors.

The assessed valuation of all the taxable property in the State in 1874—the tax on which became available in 1875—we now find was but \$200,564,710, or nearly twenty-five millions less than it was

in the previous year, 1873, on which assessment we based our estimate. Three mills—for “Construction” and “Repair” funds merged together—on the valuation of property in 1874—could only have yielded, if all was collected, \$601,694 13. From this the six and six-tenths per cent. retained, on an average, by collectors—or \$39,711 80—should have been deducted, leaving \$561,982 32, and say five per cent. from this as an approximate average—or \$28,099 11—paid to assessors, leaving but \$533,883 22 as balance available even if the entire tax was collected and accounted for. The commissions as compensation to collectors and assessors amount, as will be seen, to more than eleven per cent. at least.

REVISED AND REDUCED LIST OF LEVEES ORDERED BY THE COMMISSION OF LEVEE ENGINEERS FOR THE SEASON OF 1875-76.

MISSISSIPPI RIVER ABOVE MOUTH OF RED RIVER.

NAME OF LEVEE—PARISH.	CONTENTS IN CUBIC YARDS.	
	APPROXIMATE.	MEASURED.
Point Lookout levee, Carroll parish.....	55,746	55,746
Goodrich levee, Carroll parish.....	35,200	33,604
Bell Raleigh levee, Carroll parish.....	43,500	46,713
Bell Point levee, Carroll parish.....	6,706	4,612
Wyley levee, Carroll parish.....	648	648
Foster levee, Carroll parish.....	3,908	3,908
Total for Carroll parish.....	145,708	
Milliken Bend Ass'n levee, Madison parish.....	6,206	6,206
Omega levee No. 1, Madison parish.....	19,500	
Omega levee No. 2, Madison parish.....	19,500	
Milliken Bend levee, Madison parish.....	55,572	73,126
Mayer levee, Madison parish.....	16,500	
Nebraska levee, Madison parish.....	10,000	
Total for Madison parish.....	127,278	
Bayon Vidal levee, Tensas parish.....	25,000	
Disharoon levee, Tensas parish.....	1,980	1,980
Waterproof levee, Tensas parish.....	5,000	
L'Argent levee, Tensas parish.....	7,500	
Total for Tensas parish.....	39,480	

Arnuldia levee, Concordia parish.....	2,700	3,220
Deer Park levee, Concordia parish.....	3,000	
Ashly levee, Concordia parish.....	3,000	
Brabston levee, Concordia parish.....	2,500	

Total for Concordia parish..... 11,200

FROM THE MOUTH OF RED RIVER TO NEW ORLEANS.

New Texas levee, Pointe Coupee parish.....	2,547	2,547
Lobdell levee No. 1, West Baton Rouge parish...	15,500	18,344
Railroad levee, West Baton Rouge parish.....	4,500	4,982
Anstralia levee No. 1, West Baton Rouge parish.	38,843	38,843
Australia levee No. 2, West Baton Rouge parish.	2,000	3,098

Total for West Baton Rouge parish..... 60,843

Arlington levee, East Baton Rouge parish.....	17,879	17,879
Hope levee, East Baton Rouge parish.....	4,191	4,191
Conrad Point levee, East Baton Rouge parish....	4,121	4,121
Hollywood levee, East Baton Rouge parish.....	4,000	

Total for East Baton Rouge parish..... 30,191

Plaisance levee No. 1, Iberville parish.....	8,000	6,030
Plaisance levee No. 2, Iberville parish.....	7,200	12,068
Moore & Rodgers levee, Iberville parish.....	8,000	6,047
Bayou Goula levee, Iberville parish.....	5,000	
Craighead levee, Iberville parish.....	5,000	2,901

Total for Iberville parish..... 33,200

Gem levee, Ascension parish.....	55,000	44,023
Picayune levee, Ascension parish.....	22,000	28,266
Lacroix levee, Ascension parish.....	8,714	8,714

Total for Ascension parish..... 85,714

Lapice Laudedale levee, St. James parish.....	4,100	4,099
Lapice Pavy levee, St. James parish.....	3,500	
Cabanocé levee, St. James parish.....	30,000	10,100

Total for St James parish..... 37,600

Carroll revetment levee, St. John parish.....	4,000	
Wall levee, Jefferson parish.....	6,000	

BELOW NEW ORLEANS.

Orleans levee, Orleans parish.....	7,500	
Harlam levee, Plaquemines parish.....	2,500	
Caernavon levee, Plaquemines parish.....	10,000	
St. Ann levee, Plaquemines parish.....	3,000	
Myrtle Grove levee, Plaquemines parish.....	8,000	7,162

Live Oak levee, Plaquemines parish.....	6,200	
Point Celeste levee, Plaquemines parish.....	2,500	
St. Rosalie levee, Plaquemines parish.....	2,100	
Pierre Cosse levee, Plaquemines parish.....	2,252	2,252
Sarah levee, Plaquemines parish.....	435	435
City Property levee, Plaquemines parish.....	957	957

Total for Plaquemines parish.....	37,944	
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## ON RED RIVER.

Mack's Bayou levee, Bossier parish.....	11,000	14,124
Cannissinea levee, Red River parish.....	10,000	
Wilson and Compton levee, Rapides parish.....	48,300	48,309
Echo Landing levee, Rapides parish.....	27,000	6,300

Total for Rapides parish.....	75,300	
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Pierce's (Three Gaps) levee, Avoyelles parish....	3,400	3,199
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## ON ATCHAFALAYA RIVER.

Tom Callaban levee, Avoyelles parish.....	12,000	
Sewell levee, Avoyelles parish.....	7,000	

Total for Avoyelles parish.....	22,400	
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## ON BAYOU LAFOURCHE.

Pittman and Barrow levee, Lafourche parish.....	10,000	
Parr levee, Lafourche parish.....	3,195	3,195

Total for Lafourche parish.....	13,195	
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## ON THE OUACHITA RIVER.

Cuba Landing levee, Ouachita parish.....	10,567	10,567
Kings Bend levee, Caldwell parish.....	6,200	6,437
Works done on supplemental orders of 1874-75..	42,592	42,592

## RECAPITULATION BY PARISHES.

Carroll.....	145,708
Madison.....	127,278
Tensas.....	39,480
Concordia.....	11,200
Pointe Coupee.....	2,547
West Baton Rouge.....	60,843
East Baton Rouge.....	30,191
Iberville.....	33,200
Ascension.....	85,714
St. James.....	37,600
St. John.....	4,000
Jefferson.....	6,000

Orleans.....	7,500
Plaquemines.....	37,944
Bossier.....	11,000
Red River.....	10,000
Rapides.....	75,300
Avoyelles.....	22,400
Lafourche.....	13,195
Ouachita.....	10,567
Caldwell.....	6,200
Total by parishes.....	777,867
Works done on supplemental orders of 1874-75.....	542,592
Grand total ordered.....	820,459

#### RECAPITULATION BY RIVER DIVISIONS.

On Mississippi river, above mouth of Red river.....	323,666
On Mississippi river, between month of Red river and N. O. .	260,095
On Mississippi river, below New Orleans.....	45,444
On Red river.....	99,700
On Atchafalaya river.....	19,000
On Lafourche bayou.....	13,195
On Ouachita river.....	16,767
Total by river divisions.....	777,867
Works done on supplemental orders of 1874-75.....	42,592
Grand total ordered.....	820,459

Our Commission ordered, as before stated, one million and eighty-six thousand two hundred cubic yards of levees in 1874-75, or \$543,100 worth of work—all of which were built by the Levee Company, besides the supplemental levees—which was \$9217 more than the entire tax could provide for, according to the preceding estimate, even if every dollar of it, less the commissions allowed and paid, was collected and paid into the treasury.

The Levee Company could have been paid, possibly, in time, out of the levee taxes of 1874, for all the work done in 1874-75, but for the very large compensation allowed to collectors and assessors. If the amounts so diverted are held to be according to law, then it would seem but just that some provision should be made to reimburse the contractor for this \$9217 excess, or whatever the precise amount may be, over the possible available fund for levee purposes in 1874-75.

Upon receipt of the acting Auditor's letter, leaving it to the Commission to determine for itself what amount would probably become available for levee purposes in the year 1875-76, out of the taxes of 1875, the board met and decided that not more than one-fifth, at

the most, of the levees needed, in addition to the 207,341 cubic yards of overwork of 1874-75—to be deducted from the levee year 1875-76—could be ordered.

To the first of December, 1875, in this year, but \$429,300—which amount includes all that was collected of the back taxes of the preceding years—was paid to the levee contractor for work done.

The assessment for 1875 for the whole State is not yet—December 15—ascertained. For the city of New Orleans it is \$124,582,-102, or \$11,368,683 less than for 1874. In 1874 the country assessment was but \$64,613,925. Assuming the latter at the same figures for 1875, the total assessment will be \$189,196,027, or, say \$190,-000,000. Three mills on this will amount to \$570,000. Deducting the usual commissions heretofore allowed, \$37,620 for collectors and \$26,619 for assessors,\* and the remainder will be \$505,761. From this at least twenty per cent. should be deducted for non-collections\* and non-returns, leaving a net balance of but \$404,609, say \$400,000 for levee purposes, with which to pay the levee contractor.

This will provide for 800,000 cubic yards of levee work, but, as we must deduct 207,341 cubic yards for work already done, the available balance will only provide for 592,659 cubic yards.

This is the situation. We require, absolutely, for protection against river floods, at least 3,000,000 cubic yards of new levees; we could advantageously construct, and only feel safe with five or six millions of cubic yards of new levees, while the most that can, by any possibility, be done by the State is to provide for the building of levees, under the existing levee contract, to the extent of less than six hundred thousand cubic yards.

The State has not one dollar, in cash, to apply to this purpose directly; it can not issue a bond for any other purpose than to scale its debt; it owes, for work done under its own orders and superintendence since 1871, a very large balance in uncollected taxes; the existing levee tax will, it is assumed, probably be continued until this debt is paid—unless otherwise provided for—even if levee construction is altogether abandoned by the State; and the State is constitutionally prohibited from adding to its debt, or increasing its tax levies, or adding any new tax in any manner whatever.

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\*Assuming that only five per cent. of the amount paid into the treasury is allowed to them, as an average.

One fact, impressed upon us, and it is remorseless, is that the State of Louisiana, and we believe that other riparian States also, can no longer protect its alluvial lands from inundation.

It does not possess and can not provide the means to do so. Previous to the civil war the riparian front proprietors built their own levees principally, but that time has gone by. These proprietors are now even more helpless than the State itself; the revenue derived from their lands is as nothing compared to what it once was; they, too, are powerless.

Then what shall we do? Year after year the danger is increasing; year after year our means of defense are becoming weaker and weaker.

We see no solution of this momentous question save in an earnest appeal to higher powers for relief. Our only hope for salvation lies in the direction of Congress and the General Government.

The present system, however inadequate it may be to what is needed, must, it seems to us, be continued until the General Government comes to our relief, if any levees are to be maintained in the mean time. There is nothing else available. If we abolish it, we abolish the tax along with it. We must have help, aid, and if we do not immediately get all we ask from Congress, should we not be thankful for whatever may be given?

The Commission proceeded to reduce their list, including in it the levees built 1874-75, out of the levee taxes 1875-76,—with the following result. The quantities, generally, are approximate, except for those built in 1874-75, the precise yardage of which is given. As fast as staked out by orders of the Commission, by the State Engineer, maps and profiles of the levees ordered, with accurate calculations of quantity in cubic yards in each levee, and dimensions, are submitted to acted upon, and approved if found satisfactory, by the Commission. These maps and profiles, as approved, are signed and sealed and are then transmitted to the levee company, the contractor; an accurate copy being retained and filed.

All the notes and records of the staking out, levelings and measurements of each levee are preserved and filed for future reference whenever required. The contents of each levee are accurately determined and marked upon the map of the levee before its transmission to the levee company as the contractor. Said company has the



levees constructed in accordance with the maps, notes of dimensions and specifications so furnished.

On the completion of each levee it is inspected, tested by levelings and re-measured, to determine if it has been properly built and to grade, before it is received. All needed checks are provided and observed.

As each levee is staked out and prepared for work upon it as explained, an account is kept of the difference—whether it be a saving or an excess—between the approximate estimate given in the list and the true quantity so ascertained. If a saving, the quantity saved is allowed for on account of some new levee at some other point, rendered necessary by the caving in of the river banks after the first order. In other cases, when the new work is of more pressing necessity than some one on the list not yet commenced, or held in reserve—and there is no margin—the quantity assigned to one is transferred to the one most needed elsewhere. When the limit is reached, and still other levees must be built, the only remedy is to anticipate the next year's orders.

The State Engineer submitted a report to the Commission in September last, containing items of information which have suggested the following remarks:

The Ashton crevasse, in Carroll parish, which has been open since 1869, extends some three miles down the right bank of the Mississippi river from the Arkansas State line. A line of levee to close it was located in 1871, which was 17,000 feet in length by about twelve feet in height. It would require about 350,000 cubic yards of earthwork.

The closure of this crevasse has not been attempted, for the reason that there are many miles of broken levees in Arkansas next above it, the water passing through which floods the same section of country in Louisiana as the Ashton crevasse. The water escaping through crevasses in Arkansas—no attempts to close which have been made recently—passes down through the Macon valley, and through the river parishes of Louisiana, as far as the mouth of Red river. In 1874, this water, added to what passed out through crevasses in Louisiana above Red river, inundated an immense extent of country, and swept over the banks of lower Red river into Avoyelles parish, and thence down the valley of the Atchafalaya,



submerging both its banks. This reservoir flood was precipitated into the Mississippi river about the middle of April, 1874, through the mouth of Red river, and for thirty miles or more above it, over the river banks, thereby actually washing levees into the river from behind. The result was a sudden and unprecedented rise in the Mississippi river below Red river, accompanied by heavy rain storms, which caused the Morganza and Hickey crevasses of that year. Above Red river, at Natchez and Vicksburg, the river was considerably lower than in great flood years previously.

It would be a useless expenditure to close the Ashton crevasse until the Arkansas levees are made continuous down to the Louisiana line. To the Arkansas crevasses we owe, in part, the extensive inundations of 1874 in lower Louisiana.

The State Engineer states that "around Bunch's Bend there are some broken points that will require some six thousand cubic yards to rebuild."

At the Longwood and Elton plantations, in Carroll parish, a levee is needed 3600 feet long containing about 32,000 cubic yards, but it is not yet added to the list of works ordered.

Below, a levee is called for 1250 feet long, to contain 8800 cubic yards. Not ordered.

In the bend below Lake Providence, the great Bass levee was built last year a long distance back from the river, which, however, is encroaching rapidly upon it again. It is hoped that the Lake Providence "bar" will extend downward sufficiently to stop the caving of the river bank here, but several hundred feet in depth of the river bank has caved in within a year. The levee now is not far from the cypress swamp, at its lower end.

At Point Lookout below, a levee containing 55,746 cubic yards was built out of the fund for 1875-76, in this year, 1875. This and the Bass levee protect a rich country below Lake Providence.

About 4500 cubic yards of levee work is needed at Transylvania in a small levee about 1250 feet long.

A new levee, to extend across the Stamboul and Wilton and Melbourne plantations, from the Stamboul levee to the Airlie levee, about 6000 feet in length, to contain about 48,000 cubic yards, will soon be required. A small work across at the lower end of Stam-

boul levee, 1200 feet long, to contain 6000 yards, would suffice for a time.

At Goodrich's, the entire front levee, built before the war, has caved into the river. A new levee, to contain 33,604 cubic yards, is included in the new orders of 1875-76.

Lower down, opposite the Raleigh and Belle Point plantations, the river bank has caved in several places within two miles, taking in the old levee built years ago. During the last August rise, temporary small levees were built, which saved the country behind. The Belle Raleigh and Belle Point levees, ordered for 1875-76, here, will aggregate 11,075 feet in length, and together contain 53,713 yards. These levees were considered of imperative necessity.

At Omega, in Madison parish, the river banks are caving badly, and two breaks through the old levee have occurred. Quite an extensive new levee will be required and has been ordered here. It will be about 5880 feet long and contain about 45,500 cubic yards.

The Buckhorn levee below Omega, built in 1871, still remains, but the adjoining levee below at Milliken's bend, has gone into the river in a number of places. A line of levee was located by the Commission 900 feet back of the old levee and the town of Milliken's bend, 7490 feet long, and containing 73,126 yards, which was ordered built. The buildings of the town will again have to be moved back making nearly half a mile back in two moves since 1870.

At Maher's, below, it is hoped that a temporary small levee will suffice for next year.

A levee of several miles in length, extending below the Terrapin-Neck cut-off, to contain several hundred thousand cubic yards, will be needed ere long, but it is too much for the State ever to attempt. It must be left to the General Government, or not be built at all.

From the Maher place, to Diamond Island Bend—at Nebraska, where a 10,000 cubic yard levee is ordered—no levee is needed this year. Opposite Vicksburg a cut-off must soon occur, however, which will, as usual, accelerate the caving of the river banks and endanger the levees. The Commission measured the width of the neck of land remaining and found it to be but 650 feet, with caving banks on both sides, and a channel across partially washed out during the last floods. When the cut-off happens, the current will be thrown directly across against the bank fronting the lower portion of Vicks-

burg, whence it will be deflected to the bank at or below the town of Delta.

The State Engineer says: "The caving at Diamond Island Bend has opened three distinct crevasses, known under one general name but more properly the Diamond—from Castleman's down—the Hyco—from Carville down—and the Kellogg; across to Sargent's Point. Heretofore, both the rapid caving and magnitude of the work has prevented any proposition being made to close these breaks, but now the current of the river is passing east of Diamond Island, and the caving is nearly ceased.

"The Diamond Bend crevasse proper will require some 15,000 feet of twelve feet levee, containing about 310,000 cubic yards. The Hyco levee will be about 5500 feet long by eight feet high, and contains some 49,000 cubic yards, and the Kellogg levee about 5000 feet of seven feet high and 35,000 cubic yards. These will necessitate the closing of Harper's bayou, which will be some 500 feet long and contain about 60,000 cubic yards."

Total quantity required for the four levees, 454,000 yards.

Another line has been proposed, extending from "Castleman's" landing back to Bayou Roundaway; this would be a tremendous work."

"The work being done under your orders at Bayou Vidal prevents the water from these large crevasses—in Diamond Island Bend—from passing down over the cultivated lands of Tensas parish, and, since Harper's bayou has been opened, the clamor from Madison parish on the subject has been entirely groundless, for all the water that enters from Castleman's to Sargents' point passes out again (into the cut-off lake at New Carthage) at Harper's bayou, and does not *backup* as stated in the newspaper articles."

"The Bayou Vidal or New Carthage levee, ordered by the Commission during the spring, to be paid for from the tax of 1876, has been in process of construction, but untoward circumstances prevented its completion. It will soon be done, and will contain some 25,000 yards, in addition to the 9096 cubic yards partially estimate already given."

"From New Carthage around to Point Pleasant—in the Davis or Palmyra cut-off bend—the levees are safe, as no current runs into the old river."

At Point Pleasant the river bank receives the full force of the current, through the Davis cut-off. The caving here is continuous and very rapid, and has been so since the cut-off occurred in 1867. The extent of river bank caved in since then is more than equal to the whole width of the river, three-fourths of a mile.

"The line located here last season was not built, but some patching done instead. Your choice will now be to re-locate this line, or adopt the Styx line, as shown on map No. 13; either will require some 37,000 cubic yards."

The line required at Point Pleasant, where the river bank caves so rapidly, would have to be built entirely anew across the point, some two and a half miles in length, to be anything like a durable levee; and this would involve an expenditure several times greater than above stated, and the area of cotton land so protected would be very limited.

The Styx line mentioned would extend from the old river lake, some two or three miles from Point Pleasant up the lake, across to the Buckridge levee, a distance of about 5000 feet, and contain 36,600 cubic yards of earth. This would throw out the whole of Point Pleasant, and serve only as a partial protection at best, without the completion of the entire line of levee down to Lake St. Joseph.

The Buckridge levee forms part of this line, and it is several miles long. There are several breaks in it, and about four miles of it was built too low, by order of the Commission which preceded the present one. As the State Engineer says: "It will require some 120,000 cubic yards of earthwork to bring this levee up to your (our) standard," which would be three feet above its present grade.

At the time this levee was located, the river bank below Buckridge Landing was caving in at a very rapid rate, in consequence of the Davis cut-off. This caving has equaled the whole width of the river there since 1866. Around the bend the ground was very low—a swamp, in fact. The levee was located away back from the river, and to it again near Ship's bayou, being about seven miles long altogether.

Now, the river is taking the chute opposite the Buckridge bend, and an island has been formed to the right of it. The caving in the bend is much less than it was. It is probable that it will be the

best plan, when means can be provided to perfect this line of levee, and the Commission recommend the adoption of a new line across Point Pleasant, far enough back to be safe for a decade of years, at least, and thence down around the bend itself, throwing out and abandoning the Buckridge levee as now partially built. This work, however, is altogether beyond the means of the State, as is any line in fact from Palmyra Bend lake to Lake St. Joseph.

Just below where the Buckridge levee terminates, the river is again encroaching rapidly in consequence of the Davis cut-off. The bank has caved in to within ninety feet of the upper corner of the Alligator Bayou levee, and a new levee, to be styled the Ship's Bayou levee, is needed. It will be some 2800 feet long, and will require about 28,000 cubic yards.

Thence to Lower Hard Times, or to the lower Lake St. Joseph line, at least 25,000 cubic yards are needed to bring the levees to standard height and close old breaks on the present line, which is too near the banks of this now very rapidly caving bend.

All of the water which escapes over the river banks at Point Pleasant, Buckridge, and Upper Hard Times, floods the same section of country and flows into Lake St. Joseph. It passes thence through bayous or lake outlets into the Tensas valley.

We considered it useless to undertake any repairs of this line of levee, therefore, without perfecting the whole of it. To complete it throughout, from lake to lake, would take 210,000 cubic yards at the least, or \$105,000—one fourth of the entire available levee fund for the year—and this amount could not be spared for the purpose.

It is simply impossible for the State to undertake again any of the large works, and the sooner this is generally understood the better. If the General Government does not provide for them, these great breaks in the levees must remain open permanently.

A temporary levee was built last year at Lower Hard Times, where the river bank is also caving in very rapidly, but a larger work is needed, 3210 feet long, to contain 45,500 cubic yards, as located by the Commission last year. It is not yet ordered, for want of means, but necessity may compel its being done in anticipation of the taxes of 1877, for the protection of the productive cotton region behind it.

A supplementary work was done at Disharoon in August last, amounting to 1980 cubic yards.

From Hard Times to the town of Waterproof no work is now ordered, but from Hardscrabble to Bondurant the river bank is caving and is near to the levee. A levee is needed here, to contain about 30,000 cubic yards, 3700 feet long.

The river bank is approaching the great Marshall levee, in Tensas parish, built before the war. It is still good, but its lower end will be reached before very long. It was built by the parish of Tensas.

The great Kempe levee is safe, as yet, and in good condition, but caving in the bend in front of it is still continuous and rapid. Here, too, the right bank has caved in more than the width of the river since and in consequence of the Davis or Palmyra bend cut-off of 1867.

At Waterproof, also, the river bank has been falling in by acres at a time since the Davis cut-off. A large portion of the levee in front of the town has caved in recently, and the caving still continues. Either a temporary levee immediately back of the break must be built, which the residents at first petitioned for, or a new levee must be constructed away back around the whole town by a line at least 7340 feet long, containing about 57,000 cubic yards of earth-work. It had been decided to wait until the year's caving ceased, and then build such a "patch" as would answer for the time being, but it seems now that the main line can not be postponed. Here again the want of means interferes with the construction of the long levee, back of town, and some other less important work may have to be omitted for it. Some 5000 cubic yards was allowed, in this year's order, for the "patch."

Where the town of Waterproof was, when the Davis cut-off occurred, is now nearly across the river; and the town has recently been moved back again. The name Waterproof is a misnomer; some of her citizens have purchased town lots in the woods in the rear, to which to move, in case of necessity, to escape from the boiling, surging torrent which so rapidly undermines the river banks in front.

Two levees were built in the bend below Waterproof last season, and these it is hoped will suffice for some time longer.

Below Waterproof a cut-off is threatened across Sargent's Point. The distance around the bend is about fifteen miles, and the distance across 4000 feet, with a high water fall of 3.7 feet. Some

years ago some cut-off advocates had a canal dug across the neck for the purpose of hastening the cut-off, but the soil was too tenacious to yield quickly.

The canal is still there, however, and has been scoured out below the roots of the trees on each side, and in some places quite deep. A cut-off here would act very disastrously upon the river below, and destroy many miles of levee. The Commission recommends the leveeing up of the canal so as to stop the flow of water through it, and that this levee should be connected with the main levee line below.

Below this threatened cut-off, a small break in the levee has occurred just above l'Argent Landing. A levee to contain 7500 cubic yards was ordered here.

"At Marengo the caving has not yet reached the small work built last season, but is continuous from Bullitt's bayou around the whole bend, and will soon necessitate the building of a work staked out two years ago, which will contain about 55,000 cubic yards, or a line running round the bank of Lake Concordia, which, though much longer, will probably not contain more than 100,000 cubic yards."

In the bend below Vidalia, a small portion of the levee in front of the Arnuldia plantation has caved in. A levee was ordered here, to require about 3220 cubic yards.

The commission examined the great Henderson levee, built before the war, below Natchez island, and found that the river bank had caved in to its very base, at a point less than half a mile below the Henderson Point levee. Since then a portion of the levee itself has fallen into the river. To reconstruct this levee on a proper line, would require about 150,000 cubic yards of earthwork, while we have no margin at all to work upon. It is not yet decided whether the tax of 1877 should be encroached upon for this work. This is one of the great levees which depend upon Government aid. The State can only attend to and provide now for the small levees.

Below, at the Green plantation, and thence down across the Deer Park place, a levee about 7000 feet long, to contain say 50,000 cubic yards, should be built, but, unless the Henderson levee is constructed, it would be of little use.

"The river has reached the levee on the Ashley plantation and



broken it, and just below, on the Carr and Glasscock places, the levee has been broken by the outflow of water passing over it," into the river in 1874.

"A cave has occurred on the Brabston place. It will soon be necessary to cover this whole bend by a levee, which will contain, on the Ashley place, 37,500 cubic yards; on Carr and Glasscock's, 81,000; and on the Brabston, about 20,000 yards, or a total of 138,500 cubic yards."

The Commission ordered small levees of 3000 at Deer Park, 3000 at Ashley's, and 2500 yards at Brabston. We could spare no more.

Below these points no allowance is made for levee protection, for the reason that until the great breaks in the levees of Arkansas and upper Louisiana are closed, until the levee system is perfected above, the overflow from the rear, which comes down through lower Arkansas by way of the Bayou Macon, and through the Tensas, Black and lower Red rivers, will render front levees comparatively useless. The reservoir or overflow flood, in 1874, ran into the Mississippi river, over its banks, and over the levees from the rear.

When, if ever, the system is restored above, levees should be again made continuous down to "Cut-Off bayou," or below, as they once were. We have no data now upon which to base an estimate of this levee extension downward toward Red river.

It must be evident, after what has been written above respecting the levees needed above Red river, in Carroll, Madison, Tensas and Concordia parishes, that the State of Louisiana is, compared to what is imperatively needed, powerless to maintain the levee system there, even if nothing at all is done below Red river, and on the Red, Ouachita and Atchafalaya rivers, and ~~on~~ the bayous De Glaize and Lafourche. The cut-offs at Bunch's bend, Terrapin-Neck and Palmyra bend, have worked terrible destruction upon the sandy banks of the upper river, and there are no funds provided out of which to build such long lines of enormous levees as are required in consequence, to make them safe even for a few years at a time. Here and there a large levee has been built, but temporary relief, by means of levees of small dimensions, from corner to corner, are, as a rule, all that our means will permit of. Several millions of yards are needed now above Red river, in the parishes named, and about six hundred



thousand yards is all we have to order for the whole State. And, even if we could build several millions of yards of levees above Red river, in Louisiana, a large extent of cultivable and once cultivated land is, and will be still, liable to inundation, until several millions of yards of levees are built and maintained in Arkansas.

Louisiana has expended many millions upon her levees since the war, but the work is too great for her to continue, unaided. She must have help, or abandon all attempts at levee protection. Too much has been expected of her, and what was required has not been sufficiently well understood generally.

An absolutely permanent levee on the banks of the Mississippi river, more especially above Red river, as a means of reclaiming its fertile and valuable front lands, is an impossibility. The value of the land and its products, and the cost of levee maintenance, should alone govern the location of levees. If the means at our disposal permitted of any line we might deem best, and we were free to allow for any particular term of years for the river to reach our levee by caving, we might locate for ten years, or twenty, or fifty years, and put our levee far enough back to allow for each period.

As matters are and have been, with inadequate means, we can only do what we can, not what we wish to do.

Below Red river, the character of the river banks is somewhat different—less sandy—than it is above; they are more tenacious, and cave in less readily and rapidly. The banks are undermined and fall in, it is true, and in some years and some localities very extensively, but no cut-off has occurred since Raccourci, more than twenty-five years ago, and the lower river levees are therefore more permanent than those above.

Last season an important levee to the residents of upper Pointe Coupee was constructed at Hog Point, above Raccourci. Thence down to New Texas landing the levees are now safe.

A corner of levee below New Texas has caved in quite recently, and a new levee will be built there to close the break. It will contain about 6000 cubic yards.

The Morganza crevasse which occurred in April, 1874, in consequence of the river rising more than one foot above any previously recorded water mark, as the result of the overflow flood out of the mouth of Red river from the Arkansas and upper Louisiana cre-

vasses and the Ouachita river flood, during a stormy deluge of rain, was omitted from the list ordered last year, for want of means, and is again omitted for the same reason.

The Commission surveyed for and located a levee to close this crevasse last year, and examined it this year. It has not perceptibly enlarged since last year, and a levee containing about 200,000 cubic yards, one mile long, would close it. Soundings taken below and above it show a difference of ten feet less depth and a diminished area of section below than above this crevasse.

The great "Grand Levee" below Morganza is in excellent condition. At Morrison's three small breaks in the levee were closed last year, and thence down to the Pointe Coupee postoffice the levees are good.

Last year the Commission ordered a line of levee to be built here, but afterward, for want of means, had some smaller "patches" built. A line of new levee is needed, about 10,000 feet long, to contain 210,000 cubic yards, in this locality, but the Commission can not order it. A crevasse here would prove very destructive. Additional patches will have to be built this year. One is ordered, to contain about 1600 cubic yards.

Several small levees were built at Point Manoir last year, which may last some time longer, but the caving opposite Thompson's creek and Port Hudson is very rapid and extensive for the lower river, and the point is steadily wearing away. Before long a large levee, to cross the point and swamp away back of the old levee, will be needed. It is estimated that it will require 145,000 cubic yards.

In the bend opposite Prophet's Island small levees were built last year, and another at Lobdell's, to contain 18,344 cubic yards, is ordered for this year. A levee about 11,000 feet long, to cover the whole bend, containing 230,000 cubic yards, will be needed ere long.

Thence to the railroad depot, opposite Baton Rouge, no levees are ordered this year. At the depot a small levee will be built.

Below Baton Rouge, several important levees, including the, Patrick, Hebert, Walker, Hickey and others, were built last year and are all safe. A levee was built at Australia, containing 38,813 cubic yards, out of the taxes of 1876, and another small one is ordered for this year. On the left bank in East Baton Rouge the

Arlington, 17,879 cubic yards, Hope, 4191 yards, and Conrad Point, 4121 cubic yards, were built out of the taxes of 1876.

In Iberville parish several levees were built last year, as shown in the list, and several more are ordered for this year. At Craighead's, below the town of Plaquemine, a levee to contain 34,000 cubic yards is needed, but 5000 only is allowed for a "patch" this year.

At the town of Bayou Goula there are several exposed places, and 5000 cubic yards are allowed for temporary works this year. The river bank here, as ascertained by soundings, is very precipitous and liable to cave in at any time. A levee has been located around and back of the town, 2187 feet in length, to contain 31,629 cubic yards. Its construction can not much longer be postponed. When built, Bayou Goula will have to <sup>be</sup> waterproof behind the new levee.

A new levee was constructed around a portion of the bend below Bayou Goula, containing 36,084 cubic yards, after the caving in of the front levee last season. It should be extended up "to the Zacharie levee, as originally ordered and staked, and thus make a good and safe line around this important bend." This work will contain 2200 feet of ten-foot levee, and contain 31,000 cubic yards."

"On the left bank, around Point Clear and Blue Bar, the levee is very defective," and needs reconstruction. Some 10,000 cubic yards of work is needed here.

In Ascension parish, the levee has caved in front of the Gem plantation, and a levee is ordered to be built from the new levee above to the one below. This is a badly caving bend, and the levee required is high. It will contain 44,023 cubic yards.

Above Donaldsonville, in the bend known as the "Smoketown bend," the levee is bad in several places. An entire new line should be built, requiring 40,000 cubic yards, or more.

Opposite Donaldsonville, where a new levee was ordered last year, and "patching" substituted temporarily, it was decided to construct the new line from corner to corner of the levees above and below. It will contain 28,266 cubic yards.

Below Donaldsonville a new revetment, or an entire new levee is needed. The buildings are so numerous here and so near, that there is not room to go back far enough to get earth for a levee in front, and great damages would be sustained by putting the levee

behind them. The bank is not a caving one, but washes. A good revetment would answer all purposes. It has not yet been ordered.

At Lacroix, in the bend below Donaldsonville, a new levee was built last season, back of where the levee had caved in. It was done out of the taxes of 1876, and contained 8713 cubic yards.

Below this, on the Riverton plantation, a new levee is needed, to contain about 13,500 cubic yards.

"Around the Point Houma's plantation, right bank, there is a long line of exposed levee, which will have to be built before long. About 35,600 cubic yards will be required.

At the Lauderdale plantation a small work is ordered, to contain 4100 cubic yards; and another below, at Pavy's, which will be revetted. Both are on the right bank of the river.

In the bend at Roman's, in front of the Cabanocy plantation, St. James, right bank, a new levee has been ordered. It will contain 10,177 cubic yards.

At Cabanocy, right bank, below, a small "patch" was built last season. The additional caving here will necessitate a new levee, to contain — cubic yards, which will be constructed.

"In the parish of St. James there are several other points where new levees are required, but the proprietors prefer to preserve their yards and improvements, by 'patching' themselves, to having them turned out, while their neighbors complain and object to the State's forbearance."

In St. John parish, right bank, the levee in front of the Carroll plantation has been maintained by plank revetting for several years, and will have to be reprotected ~~again~~ in the same manner this year. A new levee is needed here, 3000 feet long, to contain about 45,000 cubic yards. Below this place, also, additional work is needed.

Opposite, on the left bank, the levee has recently caved in on the Esperance plantation. A new levee must be built here, and it will contain about 7000 cubic yards.

At Moli's store and vicinity, right bank, levee work is needed to the extent of 15,000 cubic yards.

The Bonnet Carre crevasse still remains open, no attempt having been made to close it for want of means. A small work was built of willows to protect the end of the levee above from washing or

wearing away, which answered the purpose. The width and depth of the opening through the levee line has not perceptibly increased, but the crevasse channel has washed out further back and toward the left. Large "rackheaps" of drift timber have accumulated along the right or lower side of the crevasse channel, beyond or on the land side of the levee line, and ridges of sandy deposits have formed quite extensively behind them.

The effect of this has been to turn the flow of the water northward, toward Lake Maurepas. This change has also been aided by the obstruction offered by the raising of the roadway of the Jackson railroad, between Kenner station and Pass Manchac, to the passage of the water directly into Lake Pontchartrain, and the deposits thereby caused in the swamps, between the railroad and the crevasse.

Numerous large piled water ways have been left through the railway embankment, which permit the passage of a very large portion of the crevasse discharge directly into Lake Pontchartrain, however.

It is much better that the flow of this crevasse water should be diverted into Lake Maurepas, and thus retard the shoaling of Lake Pontchartrain. It would be an advantage, in this respect, if no water was permitted to flow directly into Pontchartrain, and all of it was turned into Maurepas, by cutting away the timber so as to open a wide road or channel directly into Maurepas, through the intervening forest, if this crevasse outlet is to remain open for any considerable length of time.

It is manifest that the effect of this flow of river water—about one-tenth, probably, of the river's high water discharge—into the lakes will be in time to shoal them. The water of the lakes is made turbid by the river water—(thereby driving out the fish which are accustomed to clear sea water, from the lakes, throughout their entire extent)—and it even extends to, colors the water, and kills the oysters in their beds in Lake Borgne, and along the Mississippi coast.

The effect of this discharge of Mississippi river water into the lakes must certainly be injurious to them, and is objectionable in many respects.

The following is extracted from the last year's report of the Commission; the opinions expressed being those of Mr. Bayley:

"As regards the effect of outlets, such as the Bonnet Carré crevasse of 1874, observations and measurements show that they cause a partial filling up and contraction of the river channel below them. This, Mr. Bayley claims, was the result below Bonnet Carré in 1874.

"This crevasse occurred in consequence of the washing out of a muskrat hole or burrow in the levee, on the eleventh of April, 1874, at five o'clock A. M. It enlarged too rapidly to be checked or controlled, and remained open during the remaining portion of the flood season. The break occurred when the river there was at its highest stage. The width of the opening, when measured at low water, in August, from levee to levee, was thirteen hundred and seventy feet. A channel five hundred and fifty feet wide by about thirty feet deep, at low water, and about fifty feet at high water—measured on a line with the levee—was scoured out through the firm, clayey bank of the river by the rushing torrent, and this wash out extended—with a somewhat reduced width and depth, however—for a distance of about fourteen hundred feet back of the levee. The sectional area of the crevasse, as measured at low water, in September, 1874, was 34,895 square feet, to the top of the levee. The area of the washed out channel, to the level of the bottom of the crevasse channel on each side, between the ends of the levee, was 16,700 square feet; leaving 18,195 square feet as the area of crevasse opening, exclusive of the crevasse channel. Allowing two feet for depression of surface of the water in the opening, we have about 32,000 square feet as the present area of discharge of this crevasse at high water, and say 15,455 square feet as the actual area of discharge, exclusive of the crevasse channel.

"The opening gradually enlarged to its present capacity, after the river reached its highest stage and while it was slowly declining. We have not the data necessary for estimating how much water escaped through this outlet between April 11 and July 15, 1874, the latter date being about the time when it ceased to run through, but of course, it was less than the quantity which must flow through it at the next flood stage of the river, if the gap is left open. In order to ascertain the effect of the reduction of quantity in the river below this crevasse, Mr. Bayley, of this Commission, on the twentieth to the twenty-second of September, 1874, measured two sections of

the river above, one opposite the upper end, and two below this crevasse. At that time the river was nearly at its lowest stage, and the river water had ceased to flow through the crevasse for more than two months.

"A section taken about one mile above this crevasse, the river being then twenty feet below the high water mark, showed the then low water width to be two thousand eight hundred and eighty-six feet, the maximum depth one hundred and ten feet, and the area of water way 184,653 square feet; with a firm clay bottom, into which an eleven pound sounding lead sunk from one to two inches only. The high water width had been 3120 feet.

"Section No. 2, taken about three-fourths of a mile above the crevasse outlet, showed a low water width then of 3014 feet, a maximum depth of 79 feet, and a water way area of 164,167 square feet. High water width 3210 feet.

"Average depth of upper section 64 feet, of section, No. 2, 54 feet.

"Average of two upper sections, depth 59 feet, width 2950 feet, area 174,410 square feet.

"Section No. 4 was taken about 750 feet below the lower side of the crevasse, and No. 5 about 1500 feet below. No. 4 showed a low water width of 2406 feet, maximum depth 62 feet, water way area 96,640 square feet, average depth 40 feet; bottom, except near left bank, very soft oozy mud, into which the lead sunk from one to two feet.

"Section No. 5 showed a low water width of 2452 feet, a maximum depth of 64 feet, area of water way 106,150 square feet, average depth about 42.3 feet, bottom same as No. 4.

"Average of two lower sections: depth 41.65 feet, width 2429 feet, area of channel 101,395 square feet.

"The reduction of low water channel below (evidently caused by the crevasse outlet, as shown by the hard or firm bottom where the two upper sections were taken, and the soft oozy mud or new deposit where the two lower sections were taken, as well as the new sand bars on the right bank shore opposite same,) taking the averages of the two upper and two lower sections, amounts to 17.35 feet in average depth, 521 feet in width of low water channel, and 73,015 square feet in sectional area.

"The high water widths of channel on sections 4 and 5 were found



to be 3300 and 3430 feet respectively, and the average high water sections for sections 1 and 2, and 4 and 5, were 232,003 and 156,913 square feet respectively; the average of the lower sections, to the high water line, being 75,000 square feet less than the average of the two upper sections.

"It was also noted that there had been very extensive new deposits, forming sand bars out several hundred feet from the shore line, in the river bend next the right bank, below the Bonnet Carre crevasse outlet; and it is known that these were made, principally, during the flood of 1874.

"Mr. Bayley, of this Commission, claims that the ultimate effect of such an outlet will be to elevate the surface, or the high water line of the river, as well as its bed below it, because the reduced quantity of water requires an increased surface slope for the maintenance of that velocity necessary for its discharge; consequently, that, when the river has had time to adapt itself to the changed conditions, a permanent reduction of the normal quantity flowing in the river channel, at high water, the dangers of overflow will be increased beyond what they are now.

"In proof of this, he calls attention to the fact that while the high water slope of the Mississippi river, from New Orleans to the head of the passes, is only about one and a half inches to the mile, for the whole river, the high water slope of the Southwest Pass channel—which discharges about one-third of the river's volume—is more than two inches per mile; of Pass-a-l'Outre, more than two and a fourth inches per mile, and of South Pass, nearly three inches per mile. It is well known, he maintains, that the greater the normal quantity of water flowing in a sedimentary river, below its last affluent, the less will be its surface slope, and the greater its depth, velocity of current, and sectional area of channel. The width of the Mississippi river does not increase from the mouth of the Ohio down, but its depth does below each affluent, while the surface slope diminishes, gradually, as far down as the head of the passes, where the water is divided, causing increased slopes thence to the sea."

To close the Bonnet Carre crevasse, on a line considered best last year, would require a levee containing 300,000 cubic yards. On the twenty-eighth of September last, when the Commission inspected it, the water was still flowing through this outlet, and it could not be decided whether the same location would be far enough back.



The longer the closure of this crevasse is deferred, the more difficult and expensive it will be. The channel through it is being extended further and further back. It is hardly necessary to repeat that it is too great a work for the means at the disposal of this Commission.

In regard to the effect of "outlets" and "crevasses" upon the bed of the river, P. O. Hebert, of this Commission, and late a member of the United States Commission of Engineers, quotes as follows from the Report (H. R., 43d Congress, 2d Session, Ex. Doc. No. 127:)

"OUTLETS."

"This plan consists in abstracting from the river, and conducting by separate channels to the Gulf, such a volume of flood discharge as shall be sufficient to bring down the flood level to a height easily under the control of levees. It merits, and has received, the careful attention of this Commission. This plan has been steadily opposed by writers of ability, upon the ground that reducing the flood volume will produce deposits in the channel below the outlet (or crevasse) and thus ultimately raise, instead of lowering, the height of the flood.

"This argument, theoretically, is only tenable upon the assumption that the river water is always charged with sedimentary matter to its maximum supporting capacity, an assumption which has been shown, by three years of accurate daily observations at Carrollton and Columbus, to be utterly unfounded. Indeed, it often happened that the amount of sedimentary matter per cubic foot of water was greater in low than in high stages of the river, and never was there any fixed relations between these quantities. In other words, Mississippi river water is undercharged with earthy matter, and therefore no reasonable reduction of its flood velocity by an outlet will produce a deposit in the bed of the river.

"But, it is alleged, actual measurement has established that great crevasses do create great bars in the river below them, and the several breaks at Bonnet Carre bend are cited in support of this statement. This is an error of fact; no such evidence really exists. This mistake has been caused by the discovery, from soundings made *after the crevasses have ceased to flow*, that the channel below is smaller than that above; and it is *assumed* that the difference is due

to the crevasses. The truth is, that there is a natural contraction of the channel at this point, which has remained unchanged for at least a quarter of a century; and it is highly probable that this contraction, combined with the sharp change in the direction of the river, and the excessive height and sandy nature of the levees, is the cause of the many breaks at this locality. \* \* \* \* The channel bar has been a permanent feature for at least twenty-four years, and consequently has not been formed by any escape of the water from the river."

See United States Commission's report, Forty-third Congress, second session, H. R. Ex. Doc. No. 127, page 9, with tabular exhibit from June, 1851, to September, 1874.

M. Bayley, of this Commission, on the other hand, claims that the deposition of sediment below an outlet is not "assumed," as has been alleged, but that it is a well ascertained fact. Below the Bonnet Carré crevasse of 1874, he says, the *low water sections*, and not the *high water sections*—which latter the Levee Engineer Commission alone give—are those which show unmistakably that a large amount of deposit below did actually occur. It should be borne in mind, also, he claims, that the sections, the area of which are computed to the high water line below, are largely composed of dead water area, under the point and within the bar, where there is no perceptible current at all at any stage of the river, while the water flows, during all stages of the river, through the upper sections given.

Also, it should be remembered, that there have been three great crevasses in the Bonnet Carré bend—in 1850, 1871, and 1874—and that the section measurements which are relied upon to show that the sections were *originally contracted below*, and therefore are not the result of outlet action, were taken *the next year after the greatest crevasse of all occurred*, that of 1850, which was about one and a half mile wide; its lower side being just about where the lower side of the crevasse of 1874 is situated.

Mr. Forshey's sections were taken in July, 1850, the same year of the greatest of Bonnet Carré crevasses, but *after* the crevasse had been running several months and the river had fallen; and therefore, after the deposit thereby caused had occurred below it, he found the high water section below 68,800 square feet less than

above the outlet. Now it is "*assumed*" that this difference was *not* due to the outlet action, but was "a natural contraction of the channel at this point," below the outlet. As no sections were taken before the crevasse of 1850, to show what had been the relative area of the section previously, it is equally an "assumption" to say that no deposit occurred below, and that a "natural contraction of the channel there" existed previously. It was no "assumption" for me to say that deposit occurred below the outlet in 1874, because the new, soft, oozy mud deposits below in the low water channel, found there, together with the hard bottom above, and the great difference or diminution in width and depth below, were conclusive proofs of the fact. I saw and examined the new deposits.

In Red River, below Shreveport and elsewhere, and in the Lafourche bayou, it well known that deposits occur below every outlet, and reference is made to what is stated respecting these in this report, elsewhere. Both these are alluvial streams, like the Mississippi.

But a case in point exists in the lower Mississippi river itself, below Cubitt's Gap, a crevasse made in 1862 through the left bank of the river, about four miles above the head of the passes.

We have a record of the river depths below this great outlet—now 2700 feet wide—made by Capt. Talcott in 1838, and by the Coast Survey Department in 1875, or both before and after the outlet occurred. The missing link—a record of reliable soundings taken before the crevasse outlet happened—is here supplied.

In many instances—all that the writer knows of—as at Morganza this year, and below the great Bell crevasse of 1858, the same "contraction of channel" below the outlet was found, but measurements before the crevasses occurred were wanting. Opposite and below Cubitt's gap we have them.

Reference is here made to the coast survey maps of the Mississippi river mouths and above them, of 1839, and the late surveys by Lieut. Marinden, of the Coast Survey Department in 1875. These show an unmistakable filling up of the river bed below the "Cubitt's Gap" crevasse outlet of 1862. It can not be said that a "natural contraction of channel" because of an abrupt bend exists there, for the river is very wide and straight. Where the depths were 30, 42, 41, 37 and 28 feet, on a line across the river, with a

width exceeding one and a quarter miles about one mile above the head of the passes and below "Cubitt's Gap," but from 30 to 31½ feet is found in the deepest middle portion of the river now, and corresponding reduced depths toward each shore line—the river width remaining unchanged.

This crevasse is about 2700 feet wide, and very deep—more than double the river's depth opposite, in the deepest portion of its gorge—and discharges, according to the computations of Lieutenant Marinden, about 2:37 times as much water as South Pass. That it and the "Jump" crevasse outlet—discharging 40 per cent. of South Pass discharge, made in 1840, have had an injurious effect upon the river channel below, and probably upon the bars of the passes also, can hardly be doubted. Cubitt's Gap admits the tide into the river above the passes, and thereby diminishes the tidal flow in and out across the pass bars during the low stages of the river. The deepening of the bar channels, by tidal scour, is, therefore, probably lessened because of the existence of the new river mouth at "Cubitt's Gap." This outlet was formed by the washing out of a cut made through the river bank, into Cubitt's Canal, in 1862, by Commander David Horn, of the Government vessel "Nightingale," at the time of the siege of Forts Jackson and St. Philip, to facilitate the passage of small boats to the oyster banks and fishing grounds in the bay beyond. The commercial interests of the Mississippi valley demand the closure of both "Cubitt's Gap" and the "Jump" outlets.

As regards the "assumption," that the "Mississippi water is undercharged with earthy matter"—the meaning of which statement is not easy of precise comprehension—"and therefore (that) no reasonable reduction of its flood velocity by an outlet will produce a deposit in the bed of the river," Mr. Bayley, of this Commission, suggests that because there is a difference at different places and stages of water in the river, in its turbidity—as claimed—it is manifest that deposits must occur in the bed of the river somewhere, or there would be no difference. The Mississippi, like all other sediment-bearing streams, has its water more or less charged with earthy matter, at different times and places, according to differing circumstances. The heavier sandy particles can only be borne along in the strongest currents, and for short distances, while the finer and therefore lighter sandy or clayey particles may be and

are transported very much further. Gravel bars are not formed very far off from the bluffs whence the gravel is washed away. The lower down the river we go the finer becomes the sand composing the river bars. There can be no such thing as a uniformity of charging to the water, of any river, for earthy matter is not dissolved in water; it is only held, temporarily, in suspension, according to the velocity of the current—which, in the Mississippi as in other turbid rivers, is by no means uniform.

That the Mississippi river water is often more highly charged with earthy matter at a medium low than at a flood stage, in places, is freely admitted, and it should be so, when it is known that the alluvial river banks cave in, because undermined at the flood stages, or when the river is rising, very much more as the river declines than at other times. And then, too, when the quantity of water is reduced and confined in narrower channels, and the earthy matter precipitated into a falling river is increased, the river water should be most turbid. Does it follow that no deposits occur at any river stage, where the current is lessened by outlets, or otherwise, in the river's bed, or on one side of it? It is not claimed that the filling up of the river bed occurs most at the flood stage—none at all may happen, then, in any given locality—but as the river declines, when the current is diminishing.

Our crevasse outlets, as well as bayou outlets, have deep gorge channels scoured out through them, and they therefore discharge water as the river falls, when the river current is diminishing, and the greatest caving and largest deposits occur. That is the time when the river bed is filled up with sand and silt below an outlet.

It is conceded that a shallow and wide waste-weir high water outlet would have less depositing effect upon the river below, by permitting water to escape only at the top of the flood, than our deep channeled outlets, as they are when fully scoured out—but they can not be maintained as shallow waste-weirs over the soft alluvial river banks.

The Bonnet Carre crevasse outlet channel discharges water until the river is nearly down to its low stage, and the "Cubitt's Gap," and "Jump" channels at all stages of the river. We can not prevent our lower Mississippi river outlets from scouring out deep channels; there are no practical means of regulating them, there-

fore their injurious effect upon the river's channel below is inevitable and not to be prevented.

Because the river channel below is contracted as the river declines, and a reduced quantity passes the outlet when it rises again, the channel below is not re-enlarged to the extent that would otherwise occur if there was no outlet, and it remains more contracted than formerly. Then the law which requires a greater slope of surface to maintain a given velocity of current, for the reduced quantity flowing, begins to operate. It takes time to re-establish a new regimen for a great river like the Mississippi, but the result, ultimately, will be the same as in smaller rivers—an increased slope of surface and bed, if our deep channelled outlets are suffered to remain open permanently. On rivers of less size—as Red river and Bayou Lafourche—the changes are rapid; it is but a matter of time for the Mississippi.

We know that the flood line of the lower Mississippi has not been elevated, so far, by building levees and closing outlets, and every levee built was the closing of an outlet. We know that the water flowing through outlets can not be confined in one channel to sea in Louisiana, and that the inundation of cultivable and cultivated lands by back water from them can not be prevented, for the water must rise inland until it obtains a head to give it a current seaward. It is believed that levees can be relied upon, if properly made and maintained, sufficiently to enable us to reclaim and cultivate the whole area of land behind our levees which is above the natural drainage channels.

In view of all which, Mr. Bayley, of this Commission, again records his opinion in favor of a levee system alone and against outlets.

In St. Charles parish, new levees are needed in some few places, and where imperatively required may yet be ordered.

In Jefferson parish, the rear gates of the Barrataria canal lock have been examined, and the rear gates found to be very much decayed. The superintendent of the canal has been notified that the Commission had condemned the lock as unsafe until the old rear gates were replaced with new ones.

Opposite New Orleans, at "Bobb's" brick yard, a caving of the river bank has occurred recently, necessitating a new levee, which will be built.

Also, opposite New Orleans, below the Millaudon place, at Wall's, a new levee is needed and ordered.

In Plaquemine parish, the Harlem levee, included on this year's list, has been staked and will be built.

At Carnaervon, instead of building a new levee, the old levee will be raised to grade where too low. It is estimated that 5000 cubic yards will amply suffice for this.

At St. Ann and Live Oak, revetments of plank to protect the present levee have been ordered for this year.

At the Myrtle Grove plantation, two levees, to contain about 7162 cubic yards, are ordered.

At Pointe Celeste, reveting, to protect the present levee, has been ordered.

Several other works are needed in Plaquemine parish, as shown by the list of levees required if means could be provided to build them, but these will have to be omitted this year.

The following new works have become known as necessary—in consequence of recent cavings of the river banks—since the above was written:

In Plaquemine parish the levee has caved in on the Irvin place, left bank, just above the Mississippi and Mexican Gulf canal. A new levee, 1340 feet long, to contain about 7000 cubic yards, has been ordered to close it.

At Pointe aux <sup>Chênes</sup> ~~Chènes~~ another caving in of the old levee has occurred, requiring a levee 377 feet long, containing 917 cubic yards, to close it, which is ordered.

In St. John parish a new caving has happened on the Haydel place, right bank. A "patch" is all that can be allowed for at present to close the gap.

At Laiche's, in St. James, the same as above has happened and is allowed. Also at the Bourbon plantation, and at Cabanahocy, same parish.

A new levee is ordered, to contain about 6000 cubic yards, in front of the Dugas place, below Donaldsonville, right bank.

At Adams', at Goodwin's, and at Woods', in Iberville parish, new cavings have made levees imperatively necessary, of 800, 1500 and 6400 cubic yards, respectively. These are ordered.



## RED RIVER.

The following, respecting what is needed on Red river, is respectfully submitted:

The levee system of Red river begins at Hurricane Bluff, in Bossier parish, above Shreveport. Below this point levees have been extended down the left bank to Murray's bayou, nine miles below Shreveport, a distance, by the levee line, of about twenty-seven and a half miles, which closed all the outlets intervening except Mack's bayou, seventeen in number; among which were Willow chute, William's bayou, Benoit's bayou, and Cain's bayou. The two former discharged their waters into Lake Bodceau. All the outlets on the east side of Red river discharge their waters into streams which find their outlet again more or less directly into the river below, through Loggy and Coushatta bayous.

The Commission has included the closing of Mack's bayou—the levee to contain about 14,000 cubic yards—in its list of orders for this year. This will complete the line above Shreveport, and the protection—as stated by Assistant State Engineer Melvin—of “sixty thousand acres of cultivated cotton lands, the best producing in the State.”

It has been claimed that the shutting up of Mack's bayou will operate injuriously upon the navigation of Lake Bisteneau, and numerous petitions for and against its closure have been circulated, signed and transmitted. Mr. Melvin says that Mack's bayou “is a discharging channel from Lake Bodceau into Red river” when the latter is low, and from Red river into Lake Bodceau when it is at a high stage; at which time the flood line of the lake is seven feet below that of the river. When both are low there is no current, and only standing pools, in Mack's bayou, which is only 150 feet wide near its Red river mouth. Loggy bayou, the outlet of Lake Bisteneau, is more than one hundred miles below Mack's bayou. Engineer Melvin says that “the water from Red river will not pass through Mack's bayou into Lake Bodceau, and then through said lake, Bayou Bodceau, and numerous other bayous, into Lake Bisteneau, until there is water enough in Red river to make the navigation of Loggy bayou good without it.”

Mack's bayou, when Red river is at flood, conveys water into Lake Bodceau in a direction nearly due north. Lake Bodceau dis-

charges its waters then through Bodceau bayou into Red Chute lake, and thence through Flat river, Red Chute bayou and Swan lake into the very southern extremity of Bisteneau lake, and into Red river again through Loggy bayou and Coushatta. At the most, the effect of Mack's bayou upon Bisteneau lake must be inappreciable, for in any event it could only, at the highest flood stage of Red river, add a very little to the water which causes back water at the foot of Lake Bisteneau.

The beneficial effect of the flood water which passes out of Red river through Mack's bayou into Bodceau lake, more than one hundred miles north of where it passes back into Red river again through the foot of Bisteneau and Loggy bayou, upon the navigation of Bisteneau lake, is believed to be purely imaginary and unfounded in fact.

On the other hand, the leveeing of Mack's bayou would go far toward completing a line of levees which must ever be imperfect without it, and which will protect sixty thousand acres of valuable and fertile cotton lands in Bossier parish. It would also, by freeing that section from overflow, render it practicable to construct and maintain good roads between the city of Shreveport and the upland country east.

About 182,000 cubic yards of levee work is needed to complete, in a perfect manner, the line of levees above, from Braddock's bayou, twelve miles below Shreveport, to Hurricane Bluff, according to Engineer Melvin's estimates.

Opposite Shreveport, all the water of Red river is confined in one channel, with an extreme range of rise and fall of about thirty feet, and a width of 1160 feet. One mile below Shreveport, the high water sectional area of discharge is about 23,000 square feet. Thence below, the river is depleted by the outlets Bayou Pierre, Sand Beach bayou, and Tone's bayou, on the right bank, by Mack's bayou, Murray's and Braddock's bayous, besides eleven other smaller ones, including Lay's bayou, above Lotier Point, on the left bank.

Above Tone's bayou the river section is but about 9000 square feet, or 14,000 square feet less than above the outlets, just below Shreveport. The sectional area of Tone's bayou is about 5600 square feet, and the main navigable river below it is thereby fur-

ther reduced to a width of rather less than 200 feet—it averages but about 200 feet wide for fifty miles below—and an area of channel-way less than 3700 square feet, a loss of 19,300 square feet of discharging capacity, out of 23,000 square feet, within a few miles of Shreveport. And all of the outlets above, more than equal to four fifths of the river's capacity—says Mr. Bayley, of this Commission—have not served to reduce the flood line in the main river below Tone's bayou to any appreciable extent.

Mr. Bayley's opinion is that the process by which the portions of Red river above and below Shreveport have been nearly destroyed—by the choking up of its channel by timber rafts, the elevation of its bed and banks by overflow deposits thereupon and so caused, and the development of numerous lateral outlet channels which have depleted and caused the filling up of the main channel by deposits therein—should be reversed. The levee system, which means the closure of outlets and the confining of all the river water to one channel, should be, he thinks, systematically and persistently applied to bring about the re-enlargement of the Red river channel-way through the old as well as the new raft regions, below and above Shreveport. Levees should be located far enough away from the immediate river banks to allow for channel enlargement. Outlets should be gradually closed, as fast as the scouring out of the channel-way would permit of it. The overflow lakes to be drained by means of canals excavated into them by prolonging their discharge channels.

Tone's bayou should be closed immediately, and the right bank outlets above as soon as possible thereafter, or simultaneously, in the opinion of Mr. Bayley. At the same time, every thing possible should be done to favor and expedite the enlargement of the channel below Tone's bayou. This work would be much facilitated by the employment of a government "snag-boat" to remove wrecks, sunken logs, etc., as suggested by Mr. Fauntleroy in the report of the United States Levee Engineering Commission last year. As he says, the use of such a boat as the Government snag-boat "Aid" "would entail no great expense to the Government, while it would be of incalculable benefit to navigation and commerce, by assisting the river to acquire rapidly the requisite capacity of discharge within its own banks."

From Tone's bayou to Pascagoula bayou, right bank, a line of levees about 22 miles in length needs to be constructed, requiring according to Mr. Melvin's estimate, about 270,000 cubic yards of earthwork.

The Cannissinea levee, built by the Swamp Land Commissioners of Louisiana before the war, caved into the river in 1873-74. It closed an outlet channel discharging into Bayou Pierre lake, right bank, below Loggy bayou, in Red River parish. The rebuilding of this levee is included in the orders of this year, 11,000 cubic yards being allowed for it, on a new location further back than the old levee.

The rebuilding of Caspiana levee in Caddo parish is asked for, but not ordered. The estimate for it is 4400 cubic yards.

Below Cotile bayou, in Rapides parish, a line of levee formerly existed of great importance, which protected a very extensive area of fertile and well cultivated cotton lands. Broken levees have ruined this fine section of country. Breaks exist at Sullivan's bayou requiring 16,000 cubic yards to close it; and in the Rapides Island and Crosby bayou levees which would require 54,000 cubic yards.

Below Alexandria, 1400 cubic yards would close a break in the Corneille levee; 4100 yards the Moore crevasse; 16,500 yards the Cut-off bayou; and 1300 yards are needed for the Red House levee.

A series of breaks exist at Cumming's Point, within a distance of one and a half mile, to close which a levee 5200 feet long and ten feet high is needed to contain 65,000 cubic yards.

The Cumming's Bend crevasse requires 4400 cubic yards; the Chambers crevasses, 8800; the Bayou Latanier, 10,800 yards; the Compton levee No. 1, 8000 yards; the Sumner Grove levee, 2300 yards; the Cornella crevasse levee, 6800 yards; the Beaver Dam crevasse, 23,000 yards; the Sugar Farm crevasse, 10,000 yards; the Stafford crevasse, 6000 yards; and the Wright crevasse, 24,000 yards.

The Compton No. 2 and Wilson crevasses, to close which there will be required 48,309 cubic yards of levee work, are included in this year's orders; also, the Echo Landing crevasse, requiring 6300 cubic yards, and three breaks in Pierce's made by the military authorities in 1863; or 64, requiring 3400 yards.

The last four named crevasses discharge more water than all the others first enumerated below Alexandria, and their effect is more disastrous.

The water which flows through the crevasses above Compton No. 2, "finds its way into Bayou Lamourier" and thence "to Buck's bayou and the low grounds between it and Bayou Boeuf." The "principal sufferers are those" who cultivate the river front land. Many of these have abandoned their plantations, "it being impossible to cultivate them without levees."

The Compton No. 2, Wilson's, Echo Landing, and Pierce crevasses add immensely to the flood waters of the upper crevasses, and fill up the entire basin between Red river and Bayou Boeuf, and extend the inundation down to the bayous Houghpower, Rouge, De Glaize, and portions of the upper Atchafalaya sections of country.

The importance of the closure of these lower Red river crevasses to Rapides and Avoyelles parishes is fully recognized by the Commission, as indeed is the whole Red river system of levees. Heretofore, the exacting demands of the Mississippi river front parishes have absorbed almost the whole of the funds provided by the State for levee purposes; leaving little or nothing for the interior river levees. In case of the United States Government coming to the relief of the State, so far as it regards the Mississippi river levees, at least, if no further, the levee system of Red river and of the Atchafalaya river might be perfected, and their rich valley lands be reclaimed and restored to cultivation. It is hardly to be expected that the General Government will do more than for the Mississippi river itself—at least for some years to come.

The Atchafalaya river levees, left bank, are comparatively good for a few miles down from its head in Old river. It is not of much use, even if the means were provided out of the levee funds, to attempt to continue them so long as the Morganza crevasse remains open.

On the right bank, 19,500 cubic yards are allowed this year, to continue the existing levees below Simmsport, so far as this amount of work will extend, it being considered best to close the crevasses on Red river, in Rapides parish and upper Avoyelles—which inundate a portion of the upper part of the Atchafalaya Lands west—in preference to doing more on the Atchafalaya.

The Atchafalaya river at high water has an average surface slope of about seven and a quarter inches per mile to Grand Lake, seventy miles. The upper portion has a still more rapid fall. Hence, its current is very rapid, in flood seasons, and the banks wear away rapidly. It has been enlarging its channel way, and its discharge has been increasing, gradually but continuously, since the removal of the raft from it in 1839-40.

The Atchafalaya received the drainage of the lands on each side, through several channels, prior to the commencement of its levee system, which is comparatively of recent date. Its levee system provided for the closure of the mouths of these lateral bayous emptying into it, by levees the leveeing of both its banks, and the drainage of the lands bordering upon each side through canals excavated parallel to the river, within the levee line, to discharging outlets lower down the river. The floods of the Mississippi, Red and Ouachita rivers, which formerly submerged their banks and obstructed the discharge of the drainage channels right and left, were to be retained in its channels by levees extending down stream on both banks, while the rainfall of the country adjacent was to be provided for by means of an inner system of canals connecting the bayous, and emptying into the river lower down. The very rapid plane of descent of the Atchafalaya favored the application of this system to upper portions of the river, but it was imperfectly carried out, and never completed. Good and safe sluice gates, for emptying the interior drainage channels during the low water season, directly into the river, should form a part of it. The levees were extended down more than twenty miles.

Several of these dykes, built to close the natural side drainage channels, have given way and remain open. So long as the State is compelled to maintain the Mississippi river levees it can not do much toward the reconstruction and completion of the Atchafalaya levee system. If relieved from the care of the great river levees, it might provide for the Atchafalaya river.

On the Ouachita river, the Cuba Landing levee, already built out of the taxes of 1876, is allowed for.

The King's Bend levee, is ordered for this year; to contain 6437 cubic yards.

Much more might be advantageously done on the Ouachita, but

for the prior claims of the Mississippi river levees, and the fact that the back water from the broken levees on the Mississippi in Arkansas and upper Louisiana do far more injury to the rear lands on the Ouachita than its own floods, which rarely submerge its banks. With good levees on the Mississippi above, the Ouachita can be protected easily.

Last year this Commission, General Hebert dissenting, again advised the closing of Bayou Lafourche, by means of a dyke at its head, and the substitution of slack water navigation in said bayou, by constructing a lock near its head, behind the levee; the levee to be removed after the completion of the lock. This would save the State the maintenance of one hundred and fifty miles of dangerous levees, to increase which to standard dimensions would cost more than one million of dollars. Crevasses occur during every high water on the Lafourche, and these must continue until the bayou is closed, or locked. The lower portion of the Lafourche is not and never has been leveed; outlets or crevasses have been the rule there from year to year for many years. The result has been to cause the filling up and contraction of the unleveed channel below and a constant rise of the high water line, which is now many feet higher than it was forty years ago. Where levees of two or three feet high sufficed then, they now are required to be ten and twelve feet or more in height. Professor Forshey says: "that the levees are now made four feet higher, on the lower leveed portion of the Lafourche, than in 1851, and yet, their height should be increased yearly, to keep them above the flood line."

Mr. Bayley, of this Commission, for himself, reiterates this recommendation for the closure of the Lafourche, and offers the following in evidence of its necessity, and of what is still occurring :

"At the State canal, eleven miles below Lockport, the depth of the Lafourche, during the high water of 1858, was 24 feet. To 1874, the levees there had been raised four feet; they were that much higher in 1874 than they were in 1858, while the high water line of 1874 was 6.1 feet higher than the high water line of 1858.

"Notwithstanding this greatly increased elevation of the flood line at said canal, in 1874, the depth of the bayou was but 16 feet, in place of 24 feet in 1858. That is to say, the Bayou Lafourche, near where its levees terminate, and in a region where—above and



below—yearly crevasses are the rule, has had its flood line elevated 6.1 feet, and its bed 14.1 feet within the last sixteen years. The effect of this elevation and contraction of channel is to back the water up the bayou above, and compel the adding of more earth each year to the tops of the levees—(unless the State builds a new levee no addition is made to the base and slopes)—thereby making them more and more insecure yearly. The Lafourche levees, in consequence, are entirely inadequate to withstand the pressure of water against them; they are not half as large as they should be, for safety. Professor Forshey estimates that to bring these levees, as a whole, to the standard of dimensions for levees now adopted, would require, for the 150 miles in length of the Lafourche levees, five millions of cubic yards of earthwork.

“The State can not, and ought not to be expected to maintain such a system, and so useless a one.

“The closure of the Lafourche by a dyke, about three hundred feet long, at a cost of about \$30,000, would relieve all the lands bordering upon this stream, or natural canal, from overflow for the future. By means of a lock at its head, and keeping its channel clear by dredging, its navigation could be preserved.

“About four years ago the riparian proprietors of the Lafourche plantations almost unanimously united in a petition for the closure of this bayou. Their application should be granted.

“As an outlet for the Mississippi river—even if it is admitted that any are needed—which is denied—with a sectional area of discharge of but 3500 square feet at flood times, it is too small to be of any use whatever.

“The Bayou Plaquemine, which was very much larger and discharged four times as much water as the Lafourche, only 30 miles above it, on the same side, was closed in 1865, without any perceptible effect upon the river's flood line whatever since; for the flood line of 1862 has never been exceeded since, below it, by any river rise, and only by a storm tide on a high river at and below New Orleans in 1871 and 1874. In both these years the river below Donaldsonville did not reach the 1862 flood line.

Respecting the height of the river at New Orleans in 1874, Mr. Bayley used the following language in the Commission's last year's report:

"The extraordinary rise at New Orleans—several inches above 1862—when the highest rise, forty-five miles above, was six inches below the 1862 mark, was probably due to easterly storms in the Gulf, or to a storm tide on a high river. It is certain that the flood out of the mouth of Red river did not cause it, for the Morganza and Hickey and Bonnet Carre crevasses, above, prevented that wave or swell from reaching New Orleans. It is also known that in Plaquemine parish, below New Orleans, the comparative height of the river at the same time that it was so high in New Orleans, was still greater, for the water ran over the tops of the levees nearly every where for several days, in St. Bernard and Plaquemine parishes, where numerous crevasses occurred.

"The front lands, opposite the Belleville foundry, in Algiers, which were formed by deposits from the flood waters of the river before New Orleans was founded—there has been no appreciable change there, either by making or caving banks, since 1717—were found to be by United States Engineers Humphreys and Abbot, only three-tenths of a foot lower than the high-water mark of the great flood year 1858, and every levee built since 1717, was the closing of an outlet.

"Before, or at the time New Orleans was founded, in 1717, there certainly were one or more outlets in every river bend. Nevertheless, levees were as necessary then as now, and, to guard against overflow, they had to be built as high as now. De la Tour, the engineer who laid out the city, directed a dike to be constructed, to protect the future city in front and on the sides, from inundation, and that levee had to be as high then as now. Levees do not cause—below the junction of the last tributary at least—any increased rise of the flood line."

Major Howell, Captain of United States Engineers, in his report for 1875, gives an estimate for a stone masonry lock for the head of Bayou Lafourche, 200 feet long, 30 feet wide, 28 feet lift, complete in every particular, to cost \$127,545.

The plan upon which this estimate is based is similar to the Barataria canal lock, next the Mississippi river, opposite New Orleans; the end walls to be of stone at the gates, with side walls of earth between gates.

The following items of information, taken from last year's report,

respecting what has been done since the war, on account of levee construction in Louisiana, may be of use at this time:

"From the Engineer's report of September 7, 1870, we learn that during the preceding five years 8,135,656 cubic yards of levee work is stated to have been done in the five parishes of Carroll, Madison, Tensas, Concordia and Pointe Coupee alone, and that the total amount of levee work done, after 1865, was 12,268,829 cubic yards.

"The above work was done under Boards of Commissioners and Public Works.

"In the report of December 31, 1870, the Board of Public Works claim to have built 6,380,000 cubic yards of levees; in some cases seventy cents per cubic yard was paid.

"By act No. 7, approved February 24, 1871, the Board of Public Works was abolished, and a Board of State Engineers was created, who, by the failure of the originators of the Levee Company to organize, were left in charge of levee work. From the report of this Engineer Board, dated December 31, 1871, we learn that the Board of Public Works organized October 29, 1868, and were succeeded by the Engineer Board, March 13, 1871. The expenditures of the Board of Public Works are given as \$3,398,769 50 for 6,591,807 cubic yards of levees, and it is said 'that the cost per cubic yard, including expenses, was 59.13' cents per yard, but that the discount on bonds and warrants increased this cost very considerably to the State.

"The Board of Engineers reported, on the thirty-first of December, 1871, 'we have 14,124,371 cubic yards as being (or reported as having been) built since the war, and a contract with the Levee Company for 15,000,000 cubic yards more.' Their expenditures to close crevasses and strengthen weak points (the Engineer Board's) were \$80,269 05.

"The Louisiana Levee Company was incorporated in February, 1871, but it did not really begin work 'until December of that year. Although the originators of this company 'made a contract with the State, yet, for want of funds, they were unable to comply with their contract. The Levee Company, under the control of its then directors, was without resources,' and unable to do anything.

"Under the circumstances several citizens, large taxpayers, determined to obtain the control of the Levee Company, and by the

means of that organization to repair the levees and protect the alluvial lands as far as possible." Having done so, they raised among themselves, and deposited in the treasury of the company, about \$400,000. With this amount, and their credit based thereon, they proceeded to rebuild the levees after December, 1871, the date of the new organization.

"The position of the Levee Company from the first has been that of a contractor; the State ordering and prescribing, through its Engineer Commission, where, how, and when all levees should be built, repaired or strengthened.

The law and contract stipulated, and the intention obviously was, to provide for the continuous "strengthening, enlarging, repairing and maintenance of the levees throughout the State, in sections of five miles or more of said levees," until the whole should be brought to standard. It was made the duty of the Commission of Engineers to survey and locate said five-mile sections of levees, and report, "with maps and profiles thereof, and the number of cubic yards to be built," etc., and specially order the work to be done accordingly.

The Levee Company was to maintain the levees so completed in sections to standard.

It was found, in practice, that operations had to be confined, of necessity, as now, to works immediately needed for the closing of actual openings or crevasses—constantly occurring by the caving of the river banks—in the levees, and for strengthening weak places to prevent crevasses throughout the State, and that the "examination in detail of the levees of the whole State," to "divide them and report upon sections of five miles each, required by law," and the contract could not be accomplished.

It seems obvious that the exigencies of the situation, as regards levee protection in Louisiana, were and are not sufficiently comprehended. The amount of work to be done to construct and maintain reliable and durable levees in Louisiana is vastly greater than is generally supposed. It was erroneously supposed that the 15,000,000 of cubic yards originally proposed to be built by the Levee Company would secure permanent immunity from overflows in Louisiana; but this was a mistaken impression. Every new levee required to replace an old one must be increased largely in dimen-

sions and quantity over the previous one, because built further back, where the land is lower. The work required is much beyond the means which our State can provide, and only the General Government can, with success, undertake it. The most that we can do and have done is to keep up levees partially and in a fragmentary and imperfect manner.

The whole amount of taxes levied and collected for levee purposes is entirely inadequate for needed levee construction. It should be made the duty of riparian proprietors to keep the levees in repair when built. The passage of suitable laws providing for this is respectfully suggested.

We ask that our action, in relation to the use of both "construction" and "repair" funds for construction purposes, be approved and ratified.

Under the State's contract with the Levee Company, 1,355,648 cubic yards of levees were built to April 1, 1872, and 2,523,007 cubic yards to October 1, 1872. To October 1, 1873, 3,586,060 cubic yards had been built. To October 1, 1874, 4,323,012 cubic yards, and to October 1, 1875, 5,617,553 cubic yards.

General Abbot, in 1869, estimated the cost of a "perfected levee system" in Louisiana, at \$15,020,000; in Mississippi, at \$4,150,000; and in Arkansas, at \$19,060,000, or a grand total for the three States of \$36,230,000.

Special legislation is required in regard to rice-flumes, and the cutting of levees in low water by the riparian proprietors and communities for road-ways through them. These are a source of constant danger and sometimes the cause of disaster. The terrible crevasse at Bonnet Carre, 1871, was the direct result of a neglected "cut" in the levee.

Defective rice-flumes remain uncared for or are taken out and filled with uncompacted earth; the great Bell crevasse occurred from the latter cause, in 1858.

This matter should be under the sole and entire control of the Commission of Engineers. "Rice-flumes" should be constructed according to specifications insuring safety. "Cuts" in levees should be ordered closed, under prescribed penalties, at a given time on a rising river.

The construction of levees should include the draining, to a cer-

tain depth, of the lands immediately behind and in front of them. The strength and safety of a levee would thereby be increased. Ponds are left in front or behind them, or are formed by new deposits along the river's margin in front each year, and these constitute harbors for crawfish and muskrats. The great crevasse in the old levee at Bonnet Carre, in 1874, which still remains open, occurred from this cause, as well as many others in previous years. The riparian proprietors should be required to drain these ponds into the river during its low stages, and it should be made their duty to restore the corners of levees worn away by horseback riding upon them, or—as is common in upper Louisiana—by making public wagon roads of them, or by the destructive rootings of hogs in search of the bulbous roots of coco grass.

A reasonable contingent fund should be appropriated for the Commission of Engineers, to meet the necessary expenses of transportation, surveys, examinations and levee superintendence.

Our efforts during the past years have been much crippled for the want of appropriations to defray mileage and contingent expenses. Many investigations and measurements which would have an important bearing upon the settlement of levee questions would have been made had we had the means at our disposal.

Our levees are too important to the State to allow the want of a few hundred dollars to prevent the execution of the engineering work necessary to perfect a system involving the expenditure of hundreds of thousands annually, where a single failure of an important levee results in the loss of millions of dollars and much human suffering.

Mr. Hebert, of this Commission, submits the following in general terms:

It is our good fortune to live upon a soil naturally the most productive in the world. The Mississippi, the Missouri, the Ohio, and fifteen hundred other streams, have, as it were, selected the richest ingredients of the soils of nearly a whole continent, and by filling up and encroaching upon the depths of the ocean, have formed for the use and purpose of man a new country, than which the world offers none richer or more productive.

That the whole delta of the Mississippi river was once a mediterranean sea, can not be doubted. The geological formations of the

alluvial deposits prove this clearly and conclusively. Unfortunately, the agent of a formation and the cause of the fertility of our soil, water, is at this day a source of danger.

These very waters which have made our country periodically flood and lay waste some of its most fertile and valuable sections. The question naturally presents itself, how is this to be prevented?

How are we to reclaim the inundated lands of the alluvial basin of the Mississippi river? How are we to reclaim these immense swamps and lowlands, by far the most productive of all? How are we to protect the upper sections of the basin without injuring those lower down? And how are we to secure the lower sections without prejudice to the upper? In a word, what means must we adopt to reclaim and protect the whole alluvial country without injury to any portion of it?

This is the problem to be solved. Can it be done by levees alone? or must it be done by a combination of levees and judicious outlets?

Upon this question engineers honestly differ, as do the members of this Commission. One of the undersigned, when State Engineer of Louisiana in the years 1845-46-47, recommended and advocated the levee and outlet combination. He still adheres to these views, willing, however, to offer proper deference to the opinions of other engineers, equally competent, and perhaps superior in their arguments and conclusions. The obvious difficulty we meet on the threshold of the theory of outlets is—where to make them.

Necessity, and the river itself, may point out the sites and localities. In all improvements the greatest good to the greatest number must be the rule of action, with due regard to the value of property and the resources thereof. Sacrifices, however, with proper indemnification, must sometimes be made.

The whole question must be solved by science and experience. Let us adopt, for the present, a permanent system of levees. Then, if, in the course of time, this is found insufficient, we can resort to forcible outlets, if necessary.

One thing is clear in regard to levees. The system must be based upon accurate and exhaustive surveys, be uniform in its character, and embrace the whole valley of the river, and, once adopted, thoroughly carried out and executed, no matter how many years it takes for completion.



It is not the work of a day. Temporary remedies and levees, with a short tenure of existence, will not do. It is waste of money and misapplication of labor.

We again repeat that we see no solution of this great problem, save in the adoption by the General Government, in some form or other of the task of reclamation and permanent protection of the vast alluvial basin of the Mississippi river.

Reference is made to the reports of the State and Assistant Engineers for further information, appendixes A and B.

JAMES LONGSTREET,

P. O. HEBERT,

G. W. R. BAYLEY,

Commission of Engineers.

J. G. LONGSTREET,

Secretary.

## APPENDIX A.

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OFFICE OF BOARD OF STATE ENGINEERS,  
Capitol, New Orleans, La., September 1, 1875.

*General James Longstreet, Chairman of Commission of Engineers:*

General—All the surveys and constructions of the levees ordered by the Commission of Engineers in their general orders of October 14, 1874, and the subsequent orders, including those of August 4, 1875, having been completed, I herewith submit a list of these works, which shows that we have largely invaded the works to be paid for from the tax of 1876; and in accordance with the resolution of the Commission of August 4, which requests the State Engineers to furnish the Commission with a report of their observations as to the condition of the levees, prior to the annual general examination by the Commission, I submit the following notes as recorded by Assistant Engineer Melvin and myself, during the past season's observations and work:

ASHTON CREVASSE—I have had an opportunity to inspect this crevasse again this year. The caving has been less than heretofore, and as the young timber increases in size it offers a more rigid resistance to the current; and instead of the broad, open sheet of water that passed through this opening in 1869, we have now a few bayous or coolies, and rack-heaps that let the water pass through. The line located in 1871 is still a proper one, and this will require a levee of seventeen thousand feet in length, of twelve-feet levee, which will contain about 350,000 cubic yards.

I should here remark that the late report of the Commission of Engineers appointed by the U. S. Government shows that several miles of levees in Arkansas just above this crevasse are broken; and it is useless to construct the Ashton levee until Arkansas is prepared to construct her levees, as the same country (except a few plantations) must be inundated until ALL are closed.

Around the Bunch's Bend levees, there are some broken points that will require some six thousand cubic yards to rebuild.

At the Longwood and Elton plantations there has been a system of patching pursued for several years, and for the main line some

provision should be made. I believe the patching was correct at the salient angle which existed at this point, but now the river runs parallel to the levee for some distance, and we now need a levee thirty-six hundred feet long, and about eight feet high, which will contain about thirty-two thousand (32,000) cubic yards.

At the upper corner of what we call the Deason levee, the river has approached within a few feet, and I recommend a work here of twelve hundred and fifty feet of seven-foot levee, which will contain about 9000 cubic yards, to be called the Stone levee.

Permit me to remark, that just above this point, and near the Hagaman crevasse of some years ago, there are OLD TREES on opposite sides of the river, which only occurs at three other places in Louisiana above Red river, which indicate slow changes in their neighborhood.

At the Bass levee, built during the present levee year, the caving has been very considerable, and I fear this large and costly work will be lost in a few years, unless the "Providence bar" shall pass on down in front of it.

At Point Lookout, the work ordered by the Commission since their annual report, and to be paid for from the taxes of 1875, was duly completed, and an estimate in accordance was issued for fifty-five thousand seven hundred and forty-six (55,746) cubic yards. This work will be safe for several years.

At Transylvania, a small work was ordered two years ago, but not built, and some patching was done instead. This work requires 1250 feet of small levee, say 4500 cubic yards.

The levee known as the Stamboul runs far around a lake, through the Transylvania plantations, but at its lower junction with the old levee just above the Stamboul house the river has approached very close. A proper location at this point should extend from the Stamboul levee, across the Stamboul, and Wilton, and Melbourn plantations, to connect with the Airlie levee, as shown on map No. 4 of this office. This will require six thousand feet of eight-foot levee, or about forty-eight thousand (48,000) cubic yards. If this can not be done, a patch at the lower end of Stamboul should be built at an early day—say 1200 feet of six-foot levee, or six thousand (6000) cubic yards.

At Goodrich's, the levee is broken through, and here must be

built the work staked last year, or one approximating the same, which will be 3250 feet long of eight-foot levee, and contain some 32,000 cubic yards.

From this point we have the Illawarra and Savage levees, built during the past few years, which are still safe, until we reach the Raleigh plantation, where, at the upper end, a break occurred this fall, which was saved by a patch.

On the adjoining, or Belle Point plantation, and back into the Raleigh plantation, a long line of caving occurred, and only the energy of Mr. George Foster prevented serious damage. The work done on these two plantations during August was measured by me, under your orders of August 4.

At the Raleigh and Belle Point plantation, a continuous levee should be built of ten thousand feet in length, of seven-feet high, which will contain about seventy thousand cubic yards (7000).

On the Newman plantation, a faulty location has thrown two wings to a point, to avoid crossing a low piece of ground. The river has worn away the apex—(see map No. 5)—and a small work had to be built by the planters in August. I ask that these curtains may be connected by a work some 600 feet, of ten-foot levee, when this whole bend will be safe for years. This will require 6600 cubic yards.

At Omega, the work located by the Commission last season was not built, but instead a runround was built last spring and another this fall. The one built last spring was measured and estimated to the Milliken's Bend Levee Association, with another small piece near Milliken's Bend, and the work of August is still on my books for estimate, as per your orders. These will aggregate some 6500 cubic yards, to be paid from the tax of 1876.

I would now ask that the work ordered last season be built, which will require some 24,000 cubic yards, and, at the same time, call your attention to a new cave on the same plantation, just below, which will positively require a work of some 30,000 cubic yards, to save the country for the next planting season.

A proper location of this bend should extend from above Peck's to the Buckhorn levee, as indicated on map No. 6, and once projected, which will be some 11,000 feet of ten-foot levee, and contain 125,000 cubic yards.

The Buckhorn levee, built in 1871, still remains intact; but its neighbor, the Milliken's Bend levee, has been encroached upon for a long distance, and two small back levees have been built, one this season, as mentioned in my remarks about the Omega levee; but now there is needed a work from the work of last year to down below the town, say, some 7500 feet of eight-foot levee, to contain about 63,000 cubic yards.

The next break is on the Maher plantation, where an open hole exists; this will require a work of 3300 feet of seven-foot levee, and contain some 22,000 cubic yards.

A proper location for this bend should be a line from the Buckhorn lane to behind My Wife's Island, at a distance back that the caving that must inevitably occur below the Terrapin Neck cut-off, which precipitates the water directly against this bend, may not reach it for a reasonable number of years. This work will be 32,000 feet of ten-foot levee, and require about 450,000 cubic yards.

From the Maher place down to Diamond Island bend the levees are in comparatively good order, and safe for several seasons. There is a threatened "cut-off" at De Soto, opposite Vicksburg, which may occur next year. This will change the thread of the current for several miles above and below, and will surely do us much damage; but we must await developments.

The caving at Diamond Island bend has opened three distinct crevasses, known under one general name, but more properly the Diamond, from Castleman's down, the Hyce, from Carville down, and the Kellogg across to Sargent's Point. Heretofore both the rapid caving and magnitude of the work has prevented any proposition being made to close these breaks, but now the current of the river is passing east of Diamond Island, and the caving has nearly ceased.

The Diamond bend crevasse proper will require some 15,000 feet of 12-foot levee, which will contain about 310,000 cubic yards. The Hyce levee will be about 5500 feet long, of eight feet high, and contain some 49,000 cubic yards, and the Kellogg levee about 5000 feet, of seven feet high, with 35,000 cubic yards. These will necessitate the closing of Harper's bayou, which will be some 500 feet long, and contain about 60,000 cubic yards.

Another line proposed has been one from Castleman's landing back to Bayou Roundaway; this would be a tremendous work.

This shows that between Castleman's landing and New Carthage there are needed some 460,000 cubic yards of levee work.

The work being done under your orders at Bayou Vidal prevents the water from these large crevasses from passing down over the cultivated lands of Tensas parish, and since Harper's bayou has been open the clamor from Madison parish on the subject has been entirely groundless, for all the water that enters from Castleman's to Sargent's Point passes out again at Harper's bayou, and does not back up as stated in the newspaper articles.

Petitions are before you to build a small work at Hyce, to protect some cultivated land not injured by the other breaks.

The Bayou Vidal or New Carthage levee ordered by the Commission during the spring, to be paid for from the tax of 1876—has been in process of construction, but untoward circumstances prevented its completion. It will soon be done, and will contain some 25,000 cubic yards. From New Carthage around to Point Pleasant, the levees are safe—as no current runs in Old river, but at Point Pleasant, which receives the full force of the Palmyra Bend cut-off, the caving has been very considerable since the visit of the Commission last season. The line located last season was not built, but some patching done instead. Your choice will now be to re-locate this line, or adopt the Styx line as shown in map No. 13; either will require some 37,000 cubic yards.

The Buckridge levee, not completed in 1872, and three distinct breaks of crevasses, passed a large body of water during the spring and also during the late fall rise. Nearly four miles of this levee is too low by several feet, and it will require some 120,000 cubic yards to bring this levee to your standard.

Just below Ship's Bayou the river has reached to within ninety feet of the upper corner of the Alligator Bayou levee, and a work here is required, which will be some 2800 feet long and contain about 28,000 cubic yards.

With upper Hardtimes you are familiar. No change has occurred here since your last visit, except that the breaks have widened—and the estimate of last season will be changed but little, say 25,000 cubic yards.

The Point Pleasant, Buckridge, Ship's Bayou and Upper Hardtimes crevasses all empty into Lake St. Joseph, and then the water

passes out through bayous into the Tensas valley. Either one of these would have the same effect as all combined were it to increase to the joint dimensions, and probably they should all be considered as one work; either does a local damage, but as you are familiar with the locality I only mention the general facts.

At what is called the lower Hardtimes levee, the small work ordered last season was not completed in time to prevent the spring flood from passing out and over a very extensive and highly cultivated tract of country lying between and around lakes St. Joseph and Bruin. So soon as the waters receded the sub-contractor again commenced work, and had finished before the August flood culminated. This work is of a temporary nature, and I hope you will order the work located by the Commission last season, which will contain, as staked, 3210 feet long, average of eleven feet in height, and 45,500 cubic yards, but if this can not be done, the small work will have to be extended up to the Lake St. Joseph levees, say 2000 cubic yards.

After the failure of the contractor at Hardtimes, the flood seriously injured the upper end of the Disharoon levee, and under your orders of August 4, I had these gaps filled up and the levee repaired with an amount of nineteen hundred and eighty (1980) cubic yards of material, which is to be paid for as next season's work.

There are no breaks in the levee at this time from Hardtimes down to Waterproof, but at the lower Hardscrabble, and down to the Boudurant levee the river is very close, and here should be built, at an early day, a work 3700 feet long and containing about 30,000 cubic yards. A small work of 5400 yards is needed immediately. See map No. 14.

The next place that will claim your attention is the rapid caving in front of the great Marshall levee, built by the parish of Tensas previous to the war. This work is still intact, but in a few years the caving will reach its lower end.

The large Kempe levee is in good order and intact, but the caving in this bend still continues.

At Waterproof you will find an open break at the lower end of the levee built during this season, and this will necessitate the throwing out of the entire town of Waterproof, and a work of about 20,000 cubic yards, or a patch.



The other works built in this bend this season are intact, but permit me to call the attention of the Commission to the threatened cut-off across the Duncan Point, and ask that something be done to prevent it. Some years ago some advocates of the cut-off theory had a canal dug across this point to expedite the result. The soil has been too tenacious to effect their object, but the canal has now cut down below the roots of the vegetation, and it may commence to cave at any high water.

The length of this canal is 4000 feet, and the distance around over fifteen miles, with a fall in the river of 37 feet. A cut-off at this rate would lower the flood level about two feet temporarily, but will destroy fifteen miles of our levees before the river acquires its normal condition.

Another small cave has occurred at L'Argent, adjoining the small work built this season. This will claim your attention and require a continuation of the small work to cover this cave, say about 5400 cubic yards. Should a large work, covering the Waterproof bend, not be constructed at an early day, to connect with the levee below L'Argent, then we will soon require a work of some 20,000 cubic yards at this point.

At Marengo, the caving has not yet reached the small work built last season; but it is threatening from Bullitt's bayou round the whole bend, and will soon necessitate the building of a work, staked two years ago, which will contain about 55,000 cubic yards, or a line running round the bank of Lake Concordia, which, though much longer, will probably not contain more than 100,000 cubic yards.

In the bend below Vidalia, a cave has occurred on the Arnuldia plantation and broken the levee. This will claim your attention, and require a small work of about 3500 cubic yards.

The next dangerous point is on the Henderson levee, below Natchez island. The river has encroached upon this large and splendid work until it has reached the base of the levee at a point 1850 feet above the Henderson Point levee, and it will soon break through this large work.

On account of the height of this levee, run-rounds and patches will not answer; and the smallest work to make this safe will be about 33,000 cubic yards; and to reconstruct this levee on a safe line will require 150,000 cubic yards. See maps 20 and 21, and special map of this locality.

The small low grade levee on Mr. Geo. W. Green's plantation is still unbroken by caving, until the lower angle of Deer Park place is reached, where a small work of some 9000 cubic yards is needed; but to rebuild the Green levee on a proper line and grade will require a work 6500 feet long of six feet in height, and contain 35,000 cubic yards; and a continuance of the same through Deer Park plantation will require 7000 feet of seven feet levee, or 49,000 cubic yards.

The river has reached the levee on the Ashley plantation and broken it, and just below on the Carr and Glasscock places the levee has been broken by the overflow passing over it, and a case has occurred on the Brabson place. It will soon be necessary to cover this whole bend by a levee, which will contain on the Ashley, 37,500 cubic yards; on Carr and Glasscock's, 81,000 cubic yards; and on the Brabson about 20,000 cubic yards; or an aggregate of 138,500 cubic yards. The immediate need is at Ashley, some 5000 cubic yards; at Glasscock's, 18,000 cubic yards; and at Brabson, 4800 cubic yards.

Below this no levees are at present proposed down to Red river; but so soon as the upper levees are built, then it will be necessary to complete the line down the "Cut-off bayou" or below, as was once the case. I will make no estimate for this work.

Below Red river I found the Hog Point and Lakeside works of this year all correct and safe, down to the small work below New Texas; this may need prolonging, but soon the New Texas must be connected with the Frizelle Morganza levee as originally ordered and staked, which will be 5500 feet of 12-foot levee, and contain 121,500 cubic yards. The piece built this year, payable from the taxes of 1876, contains 2547 cubic yards. I could detect no changes at the Morganza crevasse since the visit of the Commission last season; and suppose the line then ordered and staked will still be the proper one.

This line will contain 200,000 cubic yards, but if the caving has ceased the old original line of levee nearer the bank of the river can be replaced and repaired with a much less amount of material.

The Grand levee is intact, and the small work built at Morrison's this year; all is safe down to the small works at Pointe Coupee post-office. The three small works built this year may save the country

another season; but the main line ordered by the Commission should be built, and extended to the Scott levee, which will be a work some 10,000 feet long and contain 210,000 cubic yards. A crevasse in this neighborhood would be more immediately destructive than one of four times the magnitude at Morganza, because the flood would pass over the densely settled and highly cultivated farms around Fausse river.

The works built across Pointe Manoir this year, were effective, and still remain. But the caving constantly continues, and opposite the mouth of Thompson creek and Port Hudson the point is rapidly wearing away. Soon a new work will have to be built across this point, which will require about 145,000 cubic yards of earth.

The Glennon, Hereford and Lobdell works of this year have stood the test well, though no heavy water has been against them, but the caving has extended through the levee below the works of this season, and the lower Lobdell will have to be extended and a small patch built below at an early day, say 19,650 cubic yards. Within a very few years this system of patches will have to be covered by a through line to connect with the cross levee, and will require 11,000 feet of twelve-foot levee, and contain about 230,000 cubic yards.

The levees from the cross levee, just alluded to, down to the West Baton Rouge court house, are in comparatively good order, including the Chum and Robertson, Allen and Babin levees. But below the Babin levee, and down around the point, the river is in close proximity to the levee. At the court house and railroad depot, the river has reached the base of the levee, and a work of some 5000 cubic yards is asked for.

From the depot down to Australia point, including the new works of Patrick, Hebert, Walker, Hickey and Australia, everything is safe, but the new Australia just completed is to be paid for from the taxes of 1876, viz: 38,843 cubic yards, and a small patch is still needed, which will contain about 2000 cubic yards.

On the left bank, or in East Baton Rouge, the works ordered this spring, to be paid for from the taxes of 1876, were properly completed, and contain respectively: Arlington, 17,879 cubic yards; Hope, 4191 cubic yards, and Conrad point 4121 cubic yards, and a small work is still needed at Martinez and Hollywood, which will require about 2000 cubic yards.

The small work known as the Truillet levee, in the parish of Iberville, was completed in time, and answered its purpose, but the main line ordered by the Commission will have to be built at an early day. This was called the Woods' levee, and is to be 3000 feet long, and contain 27,000 cubic yards.

The Schlatre levee, as ordered and afterward extended, was completed.

Below Plaquemine there is a weak salient point on the Craighead plantation that requires attention. If possible, the angles of the new levees should be connected, which will require about 2400 feet of levee, and contain 34,000 cubic yards; but a small work of 5000 cubic yards will save it for the season.

The wearing of the banks at the Plaisance plantation still continues, and I ask that the work staked last season may be completed, which will contain some 15,200 cubic yards.

At the Rogers' place on the left bank, the revetment is disappearing, and the line staked last season is asked for. This will contain about 8000 cubic yards; and at Dunboyne the same remarks apply, and this point will require some 9300 cubic yards. In the village of Bayou Goula are several weak points, which will require some 5000 cubic yards to make safe, but the main line behind the town should be built, which will contain about 33,000 cubic yards.

The new work ordered at the White Castle plantation was properly completed, but the line should be extended to the Zacharie levee, as originally ordered and staked, and thus make a good line of levee around this important bend. This work will require 2200 feet of ten-feet levee, and contain 31,000 cubic yards.

On the left bank, around Point Clear and Blue Bar, the levee is very defective, and as soon as Morganza and Bonnet Carre are closed will have to be rebuilt. This will require some 10,000 cubic yards of material.

In Ascension parish the first point that will claim your attention is the caving on the Gem plantation. At this place there are two large new levees, a short distance apart, and it would be well to consider the propriety of connecting these works by a proper line; say 55,000 cubic yards.

At the bend above Donaldsonville, in the settlement called Smoke-town, there are several very dangerous points, which will require

immediate attention, but a continuous and proper line should be built, which will require 40,000 cubic yards, and make that valuable country safe for a term of years.

Just below Donaldsonville, in the settlement called La Pipe on the map, the revetment has been nearly destroyed, and will either have to be replaced or a new levee built. To do this revetment properly will require 3000 feet of timber work about ten feet high.

The small works built on the Brand or Picayune plantation proved sufficient for the past season, but the line first ordered and staked should be built at an early day. This will contain 22,000 cubic yards.

The work at the Lacroix place that was ordered to be paid for from the taxes of 1876 was built, and contains 8713 cubic yards.

On the Riverton plantation a line was staked some two years ago, and a small temporary work afterward substituted. I hope you will order the original line, which will contain about 13,500 cubic yards.

Around the Point Houmas plantation, on the right bank, there is a long line of exposed levee, which will have to be built in a few years and require about 4000 feet of levee, containing about 35,600 cubic yards.

The next place that is dangerous is the Landerdale plantation, owned by Lapice and Watson, where the revetment has been destroyed and the levee worn away. This will require a new work of about 7500 cubic yards, and immediately below is a similar place on the Pavy place, where a new revetment will save for a few years, say 250 feet of revetment eight feet high, or a levee about 700 feet long, which will contain about 4000 cubic yards. The revetment is estimated as equaling 600 cubic yards of earth work.

At the Cabanocy plantation the revetment is very defective, and will have to be renewed or a new levee built. The new work if in levee will be about 25,000 cubic yards.

At the Cabahanossee plantation the levee is threatened, but not yet broken. The small work ordered there was properly completed, but two small pieces are still required, which will contain about 10,000 cubic yards. The proper work commenced three years ago and stopped by *transfer*; is still unfinished, but should be finished

whenever the means are available, and will require about 50,000 cubic yards.

In the parish of St. James there are several other points that truly require new levees, but the proprietors prefer to preserve their yards and improvements to having them turned out, while their neighbors complain and object to the State's forbearance. I will not mention these points at this time, but will, in a future communication, there being no danger of the small levees while the outlets at Morganza and Bonnet Carre exist.

In St. John, the most important dangerous place is the Carroll plantation. Here the revetment was repaired the past season by order of the Commission, and will have to be repaired again if the levee is not ordered rebuilt. The river is unusually wide here, and in high water a great eddy exists that wears away the right bank. A new and proper work at this place will require a levee 3000 feet long and containing 45,000 cubic yards.

At Moll's Store and neighborhood the same trouble exists as did on your last visit. To make this bend safe will require 15,000 cubic yards. The other levees in this parish all depend upon the closure of Bonnet Carre crevasse, which will now be mentioned.

The water has not ceased to pass through the Bonnet Carre crevasse since the spring flood, and it has been impossible to make any accurate examinations up to this time. My present impression is that the "gorge" has washed back to the woods, as the rough waves are near the woods, but the spring flood built a line of "rackheap" around the entire line of the lower side, and the fall flood passed northward toward Lake Maurepas. Of course the Commission will make their own examinations at this point; but if there is no change the location of last year will answer, which will require about 300,000 cubic yards.

There has been no new cave in the parish of St. Charles, and with the works built last spring the levees in this parish can be called safe—especially, so long as the Bonnet Carre crevasse remains open; but just below the line, in Jefferson parish, left bank, the work ordered this season, on the Oakland plantation, which was reduced to a "patch," should be built, as the importance of this locality is so great that nothing should be risked. A crevasse here would be as destructive as the Saucy crevasse was some years ago. This work requires 61,300 cubic yards.

Several small works on the right bank in Jefferson parish should be built at an early day, but the only changing bank is in Westwego and down at the Wall levee, a portion of which work was built this season, but the balance, containing 5000 cubic yards, should be completed.

In the parishes of St. Bernard and Plaquemine there are a number of small works needed, the principal of which are the line from California canal to the Cox crevasse, designated on our books as 5x 23 to station 417, Logan, Pierre Cosse, Union Church, Bohemia, Royette and Souer, Frederick to Union, Harlem, Fantasie, Fanny, and Carneavvon, on the left bank; and Belle Chasse Nos. 1 and 2, St. Ann, Sarah, Live Oak, Oakville, City Property No. 1, Myrtle Grove, La Reusitte, St. Rosalie, City Property No. 2, on the right bank, containing in the aggregate 139,244 cubic yards. It must be remembered when noticing the large number of works that have to be built in Plaquemine parish, that there are nearly two hundred miles of levees in this parish, reaching from New Orleans to the forts on both sides of the river.

For the present condition of the levees on Red river, I respectfully refer you to the elaborate report of Wm. C. Melvin, Assistant State Engineer for Red river, herewith, in which he gives a full and intelligent account of the wants of that region, and the conflict between navigation and the levee system on portions of that river, and their complete accord on other portions.

The Atchafalaya river needs a number of works, some of which are of considerable magnitude, and others, though small, are quite destructive. The principal of these breaks are the Bordelon crevasse, which will require 80,000 cubic yards; Winstead, which will require 3200 cubic yards; the Burroughs, 7200 cubic yards; Smith and Taylor, 16,800 cubic yards; Bayou Moreau, 2000; Sutton's, 3603 yards; North and Smith, 7000 yards; Marine bayou, 25,000 yards; Wright, 4200 yards, and Muscle bayou, 25,000 yards; all of the preceding are on the left bank, and in the parish of Pointe Coupee, and somewhat dependent upon the closing of Morganza, as they overflow the same country. The Gross Tete railroad, or the New Orleans and Texas railroad, will cross the Atchafalaya just above Muscle bayou, and the whole system of levee named above will have to be built to protect this road from overflow. The grading



of the railroad has been finished to the Atchafalaya and beyond for several years, and with some repairs and the bridging, can easily be prepared for the rails.

On the right bank of the Atchafalaya, levees are needed in Avoyelles, at James Callahan's of 12,000 cubic yards; Sewall's, of 7000 cubic yards; Winn estate, 27,000 cubic yards; and at Burton's, of 10,000 cubic yards; and on the Bayou de Glaze at the cut-off de Yellow Bayou, 10,000 cubic yards.

On the Lafourche, several small works were done last spring, payable from the taxes of 1876, but the larger work at Pittman & Barrow, was not done and should be included in this seasons order's.

On the Ouachita, the Cuba Landing levee has been built, to be paid for from the taxes of 1876, but a work at King's Bend, to contain about 6000 cubic yards, is badly needed, and earnestly petitioned for, as large tracts of cultivated lands are subject to overflow from this break. Having now called your attention to all the works needed on the levees in the State for this year, that you can examine them to decide which shall be built, I would then call your attention to the accompanying list of the levees that have been built during this year, which show that the levees built for 1874-75, upon the original and supplemental orders, amount to 1,128,792 cubic yards, which is an excess of 42,592 cubic yards over the original order of the Commission as published, as is shown by the new levees ordered after the list was sent to the Auditor. You will also find a list of the small works built in August, to prevent the overflow from the fall flood, which aggregate 7215 cubic yards, which will have to be included in the apportionment for 1875-76, which have not yet been forwarded to the Levee Company, and a list of the levees built by your orders, payable from the taxes of 1875-76, which aggregates 164,749 cubic yards, and thus, from the full apportionment for the year 1875-76 there will have to be deducted 207,341 cubic yards, as already built, from the taxes of 1875-76.

Respectfully submitted,

M. JEFF THOMPSON,  
Chief State Engineers.

## APPENDIX B.

OFFICE OF STATE ENGINEERS,

New Orleans, September 1, 1875.

Gen. Jeff M. Thompson, Chief State Engineers, Louisiana:

DEAR GENERAL—I respectfully submit my report upon the levees on Red river which ought to be built, inviting your attention to the importance of each levee in the order in which they appear. It is not necessary to ask your attention to the importance of these levees to the prosperity of the northwestern part of Louisiana.

The levees commencing at the foot of the Hurricane Bluff, and extending down the left bank of Red river to the north bank of Braddock's bayou, are partly inefficient, and in some places no levees have been built. You will find a description of each in its turn, and its importance mentioned. Braddock's bayou is as far down as the construction of levees ought to be continued at this time, for the obvious reason that it is at the head of a system of outflowing bayous that relieves the river of about one fifth of the volume of water that courses through the channel at Shreveport. If a system of levees was continued down, and these outlets closed, the water now discharged through them must flow through Tone's bayou and the narrow channel of Red river from the Scopini cut-off to the mouth of Loggy bayou. The evil arising from this will greatly exceed any good that can be accomplished at this time. This I will endeavor to explain in my remarks on the system No. 2.

Commencing at the foot of Hurricane Bluff, the first levee of the Red river system is the Hurricane Bluff levee, a disconnected line extending down the front of Capt. Abrams' plantation, and required only at the low places. Estimates made in 1870 fix the amount of earth required in the embankments at 4200 cubic yards.

Below, and joining the above levee, is the Dickson levee, fronting the plantation of Hon. S. M. Thomas. This, also, is not a continuous line, and the estimate made at the same time as for the Hurricane Bluff levee, fixes its aggregate length at 5500 feet, to contain 7700 cubic yards. This will join the Rough and Ready levee, fronting the plantation of Judge Land. It will be 1300 feet long,

and contain 2000 cubic yards of earth. This, and the preceding levees, will be new construction, and will connect the lower levees with a nearly continuous line from Mack's bayou to the head of the eastern basin, having Red river for its west, and the Bossier hills for its east boundary.

Willow Chute levee was built under the direction of the Board of Public Works during the year 1870. This was a very important work. It crossed Fetch bayou, Old river above and below Benton cut-off, and continued down to the Gold Point levee.

Gold Point levee, commencing at the lower end of Willow Chute levee, continues around J. Picket's Gold Point plantation to the Vance levee. The total length is 17,200 feet; of this 10,200 feet require to be in part new levee, and the remaining part should be raised and strengthened by adding base to it. The estimate for this work is 20,800 cubic yards.

Williams' Bayou levee is a large levee built by the State, under the administration of the Swamp Land Commission. It is very important that it be made secure. This levee will average eight and a half feet high. It is built across the mouth of the bayou to an island parallel to the course of the river; then crossing another branch of the same bayou to the main bank of the river. The island is too limited in width to allow of its being made safe, unless it be at an expense greater than that of building a new levee on a secure location.

The slopes of the existing levee are less than one and one half to one, while it has no perceptible crown. To make it safe will require 16,000 cubic yards of earth, that must be moved from the main bank of the river, a distance of from five to seven hundred feet. To build the levee on a new line, located on the main bank of the river, will require 35,000 cubic yards of earth.

Cash Point levee, around Cash Point, was originally built for temporary protection, and, as occasion required in times of danger afterward, it was patched and strengthened. Still the same watching and patching must be kept up. The whole line needs rebuilding with proper grade and slopes. It is 11,200 feet long, and will require 15,700 cubic yards of earth.

Griswold Point levee is in about the same condition as Cash Point, except that it is on the average a larger levee, and will require 19,000 cubic yards of earth.

Buzzard Roost Levee is in the same condition as the two last named. On the upper line of the point there occurred a large crevasse in 1867 which was closed, after the fall in the river permitted, by the planters in the neighborhood. The length of this levee is 17,500 feet; and the new embankment required is 33,000 cubic yards.

**MACK'S BAYOU LEVEE**—This is the only outlet from the river eastward, now open, from the south branch of Murray's bayou, to the bluff, Hurricane. A levee here will require a north wing 1650 feet long, and a south wing 300 feet long. The width of the bayou is 150 feet, with nearly perpendicular banks. The north wing will connect with the Cain levee; the south wing with the Chenicks bayou levee and make a continuous line of levee from Willow chute to Murray's bayou, the length of which is a little more than twenty-seven and a half miles, protecting sixty thousand acres of cultivated cotton lands, the best producing in the State. It will not be out of place here to describe the situation and effects produced by leaving Mack's bayou open. It has been asserted by some opposed to its being closed, that it is a feeder to Lake Bisteneau, and that the navigation of that lake will be seriously impaired should it be closed. This is not at all the case—at least when the stage of water in Red river is so low that it does not feed the lake through Mulberry bayou, Cut-off bayou and Ninock bayou. These three are more considerable streams than Mack's bayou, and flowing into Flat river below the foot of Red Chute lake, they are much more valuable than Mack's bayou as feeders. Mack's bayou is a discharging channel from Lake Bodceau into Red river. Its course from its source to its mouth is a few degrees west of south. The head of Loggy bayou, the navigable outlet of Lake Bisteneau, is nearly south of the head of Mack's bayou, and both discharge into the Red river, during the lower stages of water in it. The points where the river receives the contributions of these lakes are separated by a channel distance of one hundred and five miles.

Bodceau lake connects with Lake Bisteneau through Bodceau bayou, which leaves it below the head of Mack's bayou and merges into Redchute lake at its foot, from whence the water supplied by it is passed on through Flat river and Redchute bayou into Swan lake; all again uniting, before again entering Lake Bisteneau, in Flat river;

thence passing through the foot of the lake into Loggy bayou, and through it to Red river. On examining the level of local floods in the Bodceau, and comparing same with Red river at the mouth of Mack's bayou, the flood line of Bodceau is found to be about seven feet below that of the annual floods in the river. Assuming then that in ordinary years the range on the gauge will be from 0 to 30 feet, then, making proper deductions for the slope to the mouth of the bayou, the gauge reading at Shreveport (the gauge referred to above), for Bodceau flood level, will be 21.9. or 8.3 below the assumed high water at Shreveport. When the water of Bodceau is eleven feet below this line, it ceases to flow through Macks bayou, and the gauge will still read 11.9, and Mack's bayou will be without water, except in standing pools. I will not vouch for the entire correctness of these figures, but they approximate very closely. My examinations were made with the gauge reading 15.6, and the water in the mouth of the bayou, at the deepest part of the section, was 6.3, with a sluggish current into the river. Whether this current was caused by water from the lake itself, or from the draining of Redchute slough, I am unable to say. One fact, however, is very evident, that is—the water from Red river will not pass through Macks bayou into Lake Bodceau, and then through Bayou Bodceau into Lake Bisteneau, until there is water enough in Red river to make the navigation of Loggy bayou good without it.

This much has been said about what Mack's bayou will not do for navigation; I will now say what it will do for agriculture and commerce. First, it closes the gap in a system of levees that is but half perfect without it. Second, it will prevent the back land of the river plantations from being injured by back water, all the plantations below Benoist's bayou being within its influence; and the back plantations will also be freed from this source of danger. Third, many thousands of acres of the best cotton-producing lands in the State are depending upon this small piece of work, and when it is done these will at once be placed under cultivation. Each acre will give to the planter seven or eight hundred pounds of lint cotton.

In a commercial point of view, the small levee across Mack's bayou will compare in importance with its agricultural value. It will give access from the valuable upland plantations of the parishes

of Bossier, Claiborne, Webster, and the northern part of Bienville to Red river, over good roads at all seasons of the year. It will facilitate the construction of railroads from Shreveport, east of Red river, to the Bossier hills. The reasons given are certainly sufficient to warrant the expenditure of 14,000 cubic yards of earth to close it.

**MURRAY'S BAYOU CREVASSES**—The Person and Murray levee extends from the Chalk Level levee to the north bank of Braddock's bayou, and is as far down the left bank of Red river as it is advisable to continue the levees, under the existing condition of the lower part of the river. It will be a work of greater magnitude than the benefit of this single work will warrant to the planting interest, but its indirect influence on the restoration of Red river to its proper channel calls for its speedy construction. The work consists of two large breaks in the levee, near the upper end, and several smaller ones at the lower end—these last caused by the water from above pocketing behind it, and running over the top. The estimate for this is 31,400 cubic yards.

With the Murray's Bayou levee, terminating on the north bank of Braddock's bayou, we have done with levees on the left bank, above Loggy bayou. We are not yet prepared for the construction of levees on the right bank from the Shreveport bluffs to Tone's bayou. And here it is proper to take under consideration the condition of Red river below Scopini cut-off, and the causes for the above remark.

It is well known that from the cut-off to the mouth of Loggy bayou the cross section of Red river is in many places less than 4000 feet, while at the Beef Packery, one mile from Texas street, Shreveport, it is nearly 23 000 feet, showing a depletion of more than four-fifths between the packery and Scopini cut-off. This must be understood as referring to the annual high water in Red river—the low water condition being subject to different influences from that of high water, as will be hereafter explained.

Tone's bayou is the largest and by far the most troublesome stream taking its supply of water from Red river, and it discharges into Bayou Pierre. Tone's bayou has a cross-section of nearly 6000 feet, with a current of five miles per hour during low stages of the water, and proportionately greater in higher stages. The length of

the bayou, including Old river from Scopini cut-off to its junction with Bayou Pierre, is about three and a quarter miles. It is not probable that the State will again attempt to close it; and Red river, being a common highway for several States and Territories, it is proper that this work be done by the General Government for the common good. I am digressing somewhat from my purpose, which is to show that vast bodies of the rich soil of the Red river valley are, and must continue to be, without appreciable value so long as certain improvements in the condition of that part of the river known as the "narrow river," remain undone. I have accounted for the loss of more than one-fourth of Red river water by its diversion through Tone's bayou. Another fourth passes out through Sand Beach bayou, Hart Island crevasse, and Bayou Pierre. More than one-fourth passes out through the east bank, through thirteen bayous, the largest of which is Lay's bayou. This is over one hundred feet wide, and is deep enough to run all the year. Braddock's bayou is next in importance, but is dry during the low water season. The other bayous that make up this cluster are of less importance, but all together will give an aggregate section of 7000 feet. I have not made cross-sections of these bayous (flowing through the left bank), but from the sections made of the river below the cut-off, of Tone's bayou, Sand Beach bayou, Hart Island crevasse and Bayou Pierre, I find about that amount to be accounted for, and no other outlets through which it will escape, unless in extreme high water, when Mack's bayou, with a cross-section of 1210 feet, will discharge to the amount of its capacity.

The remedy for this must lie in the United States Government, and any measures adopted having for their object the improvement of navigation from Loggy Bayou to Shreveport, must, in a great measure, accomplish what is required for the protection of lands from overflow, and what it does not, the State will be able to do. I extract the following from the report of C. M. Fauntleroy, secretary of the "Commission of Engineers appointed to investigate and report a permanent plan for the reclamation of the alluvial basin of the Mississippi river subject to inundation:"

"As it would hardly be possible to carry out the work of leveeing both sides of the river at the same time, it is obvious where the work should commence.



"Time and assistance must be given to the river to scour its bed to a greater depth, and for its banks to cave. For this purpose all the growing timber of every description that is standing within sixty feet of the crest of its banks should be cut away; roots and stumps loosened; in short, every thing should be done to facilitate the caving and scouring process. A snag boat should be kept at the work of removing the obstructions in the bed of the river, such as wrecks of steamers and barges, sunken logs," etc., etc.

"For this purpose the United States steam snag boat Aid is well adapted, and it would entail no great expense to the government, while it would be of incalculable benefit to navigation and commerce, by assisting the river to acquire rapidly the requisite capacity of discharge within its own banks.

"The character of the soil composing these banks is such that upon examination of them, any engineer would concede the correctness of this conclusion."

Enough has been said in reference to the first system of levees on this river.

The second system is that from the bluff, below Shreveport, to Tone's bayou. Its construction depends upon the execution of the much needed improvement in the channel of the river below Scopini's cut-off. As that work must include the closing up of the mouth of Tone's Bayou, and other outlets of the river, in order to compel a greater volume of water to follow its proper course, through the original and only channel useful for navigation, it would be unwise, then, to advocate the construction at this time of any levees on this system; but, as we may reasonably hope that, at no far off day, the Government will have continued to completion the system of improvement to the navigation of this river, commenced by the removal of the great raft, and rendered a work of greater necessity than when the raft remained. I have made preliminary surveys of a line of levee that will be needed in this system, including a portion of the third system, from Tone's bayou to the Pascagoula bayou levee; taking it for granted that the Government will levee Tone's bayou, Sand Beach bayou, and Bayou Pierre. This line of levee, twenty-two miles in length, will require 270,000 cubic yards of earth, and if it must include the bayous, it will require an additional 92,000 cubic yards.

In the third system, from Tone's bayou to Bayou Wincey, we have some small levees that it is important should be constructed during the current year. I will name them in the order of their respective importance.

Cannisinia levee, built by the Swamp Land Commission, between the years 1858 and 1860, closed a river outlet. It was, and will be again if permitted to remain open, of capacity sufficient to overflow all of the cultivated lands below Bayou Lachute and Grand bayou, and was a direct feeder of Bayou Pierre lake. The levee caved into the river during the year 1873-74. Its situation, below and opposite the junction of Loggy bayou with Red river, brings it within the wearing force of the united currents of both streams. The new location is accordingly some distance from the river bank. The work required is small, and it should be done before the next flood. It will require 10,400 cubic yards to build the new levee as located. It is in Red River parish.

Caspiana levee, in Caddo parish, is also very important. The existing levee is not yet lost, but the wearing of the bank has encroached so much upon it that nearly four hundred feet of the crown has worn off, and all of the water slope, so that the crest of the levee now forms the crest of an almost perpendicular bank. Should it break during high water, the crevasse would inundate not only the Prairie River plantations, but also the river places down to Cotton Point. The estimate for the work is 4400 cubic yards.

With a knowledge of the inability of the Commission to award Red river a sufficient number of yards to more than construct such works as are absolutely indispensable, I will merely refer to other works in this system that must give way to greater necessities on the Mississippi river:

Hogskin Point levee .....	22,000 yards
Nick Gilmer levee .....	2,400 yards
Nesbett levee .....	2,600 yards
Magnolia levee .....	1,300 yards
Templeman levee .....	1,700 yards
Campo Bello levee .....	5,800 yards
Cross Keys levee .....	1,800 yards
Pecan Point levee .....	6,300 yards
Bayou Lachute levee .....	12,000 yards
Elmwood levee .....	36,450 yards

Passing the fourth, fifth, sixth and seventh systems; as divided by the Commission of Engineers in their report of 1873, as not needing any new work or repairs on those existing, we come to the eighth system, from Cotile bayou to Edwards' landing. Within this system we have three great interests depending eminently on good levees. These are the culture of cotton, sugar cane and railroad building. In times of prosperity this whole district bloomed as a well cultivated garden. Substantial levees were built from Cotile to Point Maurice, and the planter tilled the soil with a surety of gathering remunerative crops. Plenty was found in every household.

Now the levees are broken, plantations are laid in waste, sugar houses and gin houses are decayed, and not one acre in five of the lands formerly so well cultivated can be tilled on account of broken levees.

The actual crevasses in this part of Red river systems are: Sullivan's bayou, about four hundred feet long, in the old levee. I doubt the propriety of closing it, unless the canal dug by the State is reopened, either by the State, or, as would be more proper, by the enterprise of the land proprietors whose lands are effected. It will require about 16,000 cubic yards of earth.

In Rapides, Island levee and Crosby Bayou levees, both or neither should be built. The planting interests behind these levees are not of sufficient importance to warrant their being built in the present financial condition of the State, and, unless the railroad now being constructed up through the island is of sufficient importance to warrant the outlay for, 54,000 cubic yards of earth by the State, it will be as well to let them alone for the time being.

Below Bayou Rapides is the Alexandria levee. That, I suppose, is a corporation affair. I presume, if a levee is to be built by the State, it should be built behind the town, as very few owners of town lots care to give them up for a levee line.

The Corneille Levee crevasse is a dangerous place, that a small runaround will be sufficient to secure; estimate, 1400 cubic yards.

Moore crevasse—1200 feet of  $5\frac{1}{2}$  feet levee; 4100 yards.

Cut-off bayou—dangerous; 1500 feet of 10 feet levee; 16,500 yards.

Red House levee—dangerous; 400 feet of  $5\frac{1}{2}$  feet levee; 1300 yards.

**Cummins' Point crevasse**—This is a series of breaks in the levee, extending from the bend above the point to the extreme point, a distance of one and a half miles. The line of new levee required is from the corner of the old graveyard, directly across the point, to an elbow in the levee below the mouth of Cummins' bayou. This line will be 5200 feet long and 10 feet high; it will require about 65,000 yards.

**Cummins' bend crevasse**—1100 feet of 6 feet levee; 4400 yards.

**Chambers' crevasse**—two breaks; 2000 feet of 6 feet levee; 8800 yards.

**Bayou Latanier**—dangerous; 600 feet of 13 feet levee; 10,800 yards.

**Compton No. 1**—dangerous; 1000 feet of 8 feet levee; 8000 yards.

**Summer Grove**—dangerous; 400 feet of  $7\frac{1}{2}$  feet levee; 2300 yards.

**Cornella crevasse**—Closed in 1871 by Mr. Cornella; broke again at the lower end and closed again in 1874. The work done was only temporary, both in construction and location. The work needed on my location is 1700 feet of 6 feet levee; 6800 yards.

**Beaver Dam crevasse**—4800 feet of  $7\frac{1}{2}$  feet levee; 23,000 yards.

**Sugar Farm crevasse**—2200 feet of  $6\frac{1}{2}$  feet levee; 10,000 yards.

**Stafford crevasse**—1700 feet of 6 feet levee; 6000 yards.

**Wright crevasse**—5900 feet of 6 feet levee; 24,000 yards.

**Compton No. 2 crevasse**—This, at the time of the survey, was a small crevasse; it has since become enlarged, and is now connected with Wilson's crevasse, requiring 6900 feet of 8 feet levee; 45,300 yards.

**Echo Landing crevasse**—1400 feet of 14 feet levee; 27,000 yards.

**Peirce's three breaks**—To close three cuts [made by the military in 1863 or '64, 3600 yards.

The last four levees named have an effect in part independent of the others above. The volume of water passing through them is greater than the combined waters of all those above and the effect more disastrous.

The flow from the river through the nine crevasses above the Compton No. 2 finds its way into Bayou Lamourier, and from it to Back bayou, and the low grounds between it and Bayou Boeuf. The amount of water passing through these breaks would not of itself do any great amount of damage to lands west of the La-

mourier. The principal sufferers are those planting on the river front, and many of these plantations have been abandoned, it being impossible to cultivate them without levees. The proprietors are unable to build levees themselves, and the State is also without the means to build. The great increase to the body of water coming from above, which has already filled the sloughs and bayous to their utmost capacity, passing through the large crevasses at Wilson's and Echo landing, is then the greatest source of damage, causing a general overflow of all these streams, and inundating the middle lands of the entire valley west of the river to the Bayou Boeuf, and reaching down to the Bayou Houghpower, Bayou Rouge, Bayou De Glaize, Yellow bayou, and parts of the Atchafalaya above the mouth of Bayou Rouge. These levees, from Compton No. 2 and below, then certainly deserve the consideration of the Commission of Engineers, and it is to be hoped the order for their construction will be issued and not again revoked.

I have made this report longer than I anticipated, but so many facts in connection with the subject present themselves that I have found place for but a few of them.

It is to be hoped that the National Government will take absolute control of all levees on the Mississippi river, and at least such levees on its tributaries as have a direct influence on the navigation of them. All such works are surely national, and do not belong to individual States.

I think that if our representatives in the Congress of the United States will take this matter under consideration they will readily see the importance of it, not only to our own State, but to all other States interested in an outlet to the sea through the Mississippi river, and in the cultivation of the lands in the great valley.

Respectfully,

W. C. MELVIN,

Assistant Engineer, Red River District, Louisiana.

#### RED RIVER LEVEES.

##### BOSSIER PARISH, LEFT BANK.

LENGTH IN FEET. HEIGHT. CUBIC YDS.

To be new—Hurricane Bluff. ....	3,000	3½	4,200
To be new—Dickson. ....	5,500	3½	7,700
To be new—Rough and Ready. ....	1,300	3½	1,800
To be repaired..Gold Point. ....	10,400	4	20,800

LENGTH IN FEET. HEIGHT. CUBIC YDS.

To be repaired—Cash Point.....	11,200	3½	15,700
To be repaired—Griswold Point.....	9,600	4	19,000
To be repaired—Bazzard Roost.....	17,500	4	33,500
To be new—Mack's bayou.....	2,100	....	10,900
To be new—Murray's bayou.....	15,700	4	31,400
To be new—Williams' bayou.....	2,800	9	33,000

## CADD O PARISH—RIGHT BANK.

To be new—Bayou Pierre.....	.....	.....	.....
To be new—Grigsby Island.....	.....	.....	.....
To be new—Shreve's Island.....	.....	.....	.....
To be new—Dixie.....	.....	.....	.....
To be new—Eagle Bend.....	.....	.....	.....
To be new—Bagley.....	.....	.....	.....
To be new—Dufresne.....	.....	.....	.....
To be new—Riverdale.....	.....	.....	.....
To be new—E. K. Hall.....	.....	.....	.....
To be new—Staten.....	.....	.....	.....
To be new—Tone's bayou.....	.....	.....	.....
To be new—Peace Point.....	.....	.....	.....
To be new—Long Point.....	.....	.....	.....
To be new—Godwin.....	.....	.....	.....
To be new—Hogskin Point.....	11,000	4	.....
To be new—N. Gilmer.....	700	5½	.....
To be new—Nesbett.....	1,300	4	.....
To be new—Magnolia.....	900	3½	.....
To be repaired—Caspiana.....	2,200	4	4,400
To be new—Templeman.....	1,200	3½	.....
To be repaired—Campo Bello.....	2,800	4	.....
To be repaired—Cross Keys.....	800	4	.....

## RED RIVER PARISH—RIGHT BANK.

To be rebuilt—Bayou Lachute.....	1,600	....	12,000
To be rebuilt—Cannisia.....	2,300	6½	10,300
To be new—Pecan Point.....	900	8	6,300
To be new—Elmwood.....	8,100	6½	36,500

## RAPIDES PARISH—RIGHT BANK.

To be rebuilt—Sullivan bayou.....	400	30	27,000
In danger—Crosby's bayou.....	2,600	9	24,000
To be repaired—Rapides Island.....	5,800	7	30,000
To be repaired—Alexandria.....	.....	.....	.....
To be repaired—Corneille.....	500	5	1,400
Crevasse—Moore.....	1,200	5½	4,100
In danger—Cut-off bayou.....	1,500	10	16,500
Red House.....	400	5½	1,300
Crevasse—Cummings' Point.....	14,700	7½	82,000
Crevasse—Cummings' crevasse.....	1,100	6	4,400

LENGTH IN FEET. HIGHTH. CUBIC YDS.

Crevasse, two breaks.....	2,000	6	8,000
In danger—Latanier bayou.....	600	13	10,800
Crevasse—Compton No. 1.....	1,000	8	8,000
Crevasse—Summergrove.....	400	7½	2,300
Crevasse—Cornella.....	1,700	6	6,800
Crevasse—Beaver dam.....	4,800	7½	23,000
Crevasse—Sugar Farm.....	2,200	6½	10,000
Crevasse—Stafford.....	1,700	6	6,800
Crevasse—Wright.....	5,900	6	24,000
Crevasse—Compton No. 2; included in Wilson levee.....	.....	..	.....
Crevasse—Wilson.....	6,900	8	48,300
Crevasse—Echo Landing.....	1,400	14	27,000
Cut 1864—Three breaks.....	1,200	5	3,600

The levees italicised should have preference, as they all are either isolated or effect a system of protection independent of others.

W. C. MELVIN.

September 30, 1875.